MS Excel Bootcamp

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Contents

Preface

Why another textbook on Microsoft® Excel®? As an instructor, past learner of many professional-technical technology courses, and worker in the private/public workforce, I have learned a good deal about how Excel can be used and how it can be efficiently rolled out for new and developing users. I try to bring a realistic Universal Design approach, and to tell a story of Excel usage that makes sense to learners and workers who use the application in various settings. In a way, this order also allows for learning in stages and being able to get to work fast, even if one cannot complete a full course of study before doing so.

- *Program introduction*: The layout, user interface, options, etc.
- *Worksheet management*: Making, styling, editing, and manipulating documents for solo and team work.
- *Data input, formatting, use, and organization*: Adding text, graphics, and

numeric data to documents so Excel can work its magic, plus using Excel tools (like tables) for consolidating, sorting, and filtering data.

- *Workbook(s) management*: Working with multi-sheet workbooks, and multiple workbooks.
- *Basic and intermediate formulas for calculations*: Formulas / functions for creating meaningful data from raw numbers, so that you can use Microsoft® Excel® to communicate information like budgets, etc.
- *Summarizing data with summary and pivot tables*: Summarizing data that you create so that people can understand/use it for reporting.
- *Displaying data with charts and graphs*: Displaying data from your tables in easy-to-view live graphics so that people can use it for reporting.
- *Data informatics and analysis tools*: Acquiring big data and cleaning/modeling it for problem solving.

I have developed additional content, new

examples, and fresh assessments that are different from previously adapted versions of the source OER materials, in keeping with Universal Design and an eye to Diversity, Equity, and Inclusion (DEI) principles. I have also simplified the design format of the book(s)/course(s) from the previous versions to help them be as accessible as possible, regardless of format (computer, mobile, accessible pdf or E-pub, etc.

This book attempts to focus on analyzing and solving business-related problems in basic and efficient ways; they are *not* the only ways. This book does not focus on AI tools or automation, both rather the basics of learning and working with how Excel actually functions for the average user. Automation and AI tools will have their place, yet understanding the underpinnings of the program's use and value has to come first.

Learners are offered clear, easy-to-follow guidance for each skill presented. Learners can approach the objectives with detailed steps in *Try Me activities*, and try things out in the *ACTION: Quick task* options. Learners should

be challenged to use critical thinking to solve real world scenarios, because what is all this for if not to help enhance one's education and workplace future?

NOTE: As workflow develops to include more automation, data analysis tools, and more of a focus on business informatics, Excel is modifying into a more robust tool. Aspects of its functionality, including contents and tasks on various toolbar/ribbons, will continue to change and add more options for intermediate-to-advanced work, such as more automation, power queries, and AI-assisted analysis with CoPilot. We are not covering these in this textbook.

Disclaimer: One thing to keep in mind is that Microsoft Excel is part of MS Office's subscription as a service (SaaS). As such, it has regular updates and modifications to its user interface and sometimes even how items are named. While this book strives to be accurate and current, learners will occasionally see variations – PC from Mac, last month to this month, etc. Things like the phrase 'hyperlink' being changed to just plain 'link' will happen,

as will minor phrasing or placement in Excel's options, ribbon/toolbars, dropdown menus, etc. Learners are encouraged to be adaptable to this.

This book also attempts to have a personal feel and occasionally some quirks in humor. Who wants a totally boring author?

Suitable Learners

This book can be used by:

- Adult Basic Education (ABE) learners.
- I-Best business and technology programs.
- Worker retraining programs at colleges and employment service centers.
- Learners at community colleges, training programs, and high schools.
- Professionals as a quick review of business technology information and skills.
- Self-study learners.
- Anyone else with an interest in the covered topics.

Introduction: Using this Book as a Course

How to Access This Book

This textbook is available in the following **Pressbooks**-generated formats:

- **HTML.** An HTML file can be opened in a browser. It has very little style so it doesn't look very nice, but some people might find it useful.
- **Mobile.** If you want to read this textbook on your phone or tablet offline, you can use the EPUB (eReader) or MOBI (Kindle) files.
- **Online webbook.** You can read this book online on a computer or mobile device in one of the following browsers: Chrome, Firefox, Opera, Edge, and Safari.

- **PDF.** You can download this book as a PDF to read on a computer (Digital PDF) or print it out (Print PDF). **Note**: if you choose to have this book printed out in PDF format for your own study use, I am fine with this, and you should let your printer know this approval is part of the Open Educational Resource (OER) nature of this publication.

You can access the online webbook and any of the formats for free. To download the book in a different format, look for the "Download this book" drop-down menu on the book's startup page and select the file type you want.

To access a shared CANVAS course of the textbook with the downloadable *StudentDataFiles.zip,* you will need to visit CreativeCommons: look for Business Spreadsheet Fundamentals CANVAS Course: BSF_2024, which (with files) is currently available **HERE**.

How to use different formats:

Format	Internet required?	Device	Required apps	Features	Screen reader compatible
Online webbook	Yes	Computer, tablet, phone	An internet browser (Chrome, Firefox, Edge, or Safari)	Option to enlarge text and compatible with browser text-to-speech tools.	Yes
PDF	No	Computer, print copy	Adobe Reader	Ability to zoom in, highlight, and annotate the text.	*Unsure*
EPUB and MOBI	No	Computer, tablet, phone	Kindle app (MOBI) or eReader app (EPUB)	Option to enlarge text, change font style, size, and colour.	*Unsure*
HTML	No	Computer, tablet, phone	An internet browser (Chrome, Firefox, Edge, or Safari)	Option to enlarge text and compatible with browser text-to-speech tools.	Yes

MedAttrib: author-generated. Textbook format options and features.

Tips for Using This Textbook

- *Annotate the textbook:* If you like to highlight or write on your textbooks, you can do that by getting a print copy, using the Digital PDF in Adobe Reader.
- *Navigate the textbook:* This textbook has a table of contents to help you navigate through the book more easily. If using the online webbook, you can find the full table of contents on the book's homepage or by selecting "Contents" from the menu when you are in a chapter. The contents may be collapsed or expanded as needed.
- **Search the textbook:** If using the online webbook, you can use the search bar in the top right corner to search the entire

book for a key word or phrase. To search a specific chapter, open that chapter and use your browser's search feature by hitting **[CTRL] + [f]** (PC) or **[CMD] + [f]** (Mac).

· The **[CTRL] + [f]** and **[CMD] + [f]** keys will also allow you to search a PDF, HTML, EPUB, and MOBI files if you are reading them on a computer.

If using an eBook app to read this textbook, the app should have a built-in search tool.

Key Features

As an aid to learners, the book provides some useful features:

· Callouts on specific tips and keybind shortcuts.
· Clear and easy-to-understand written format and style. Materials presented in visual color and and gray scale format.
· Clear step-by-step instructions***** for in-chapter activities.

- Key terms, definitions, phrases, concepts, etc. are located with a glossary.

* Instructions are designed for book learners. They are meant to be used independently of any classroom instructions. Learners who use this book within a course provided by an instructor may be asked to save their student data files, their working files, and their resources in *different* places than the book instructs, and that is okay. They may also be asked to *rename* their working files per their instructor's requirements, which is also okay. *It is up to the learner to differentiate* between what the solo-study instructions are and what their course instructor – if any – requires *instead*.

Doing the Work

This Open Education Resources (OER) book can be used as a stand-alone overview, for general practice, and/or for a course that teaches introductory-to-intermediate business

technology information and productivity applications' basics. This book includes:

- Data files (Excel .xlsx, CSV, database, and image files for students to work with)
- Examples for learners to try out (*Try Me activities*)

However, this book does **not** currently include additional starter or finished classroom assignments used by L.J. Bothell in a full course, or video/demo resource links, or other personalized/in-the-moment resources. Instructors will likely create, have and/or access full assignment content, steps, previews, and example finished product documents. A later edition may include a few generalized classroom assignments; this edition does not.

- Alternately, learners can also access demos on productivity tool exercises, and other training demos/tutorials, on the web. Sources can include LinkedIn Learning, free online learning academies, free Microsoft and Apple resources and tutorials, etc. Learners may also look up L.J.

Bothell tutorial videos on YouTube (produced 2023.)

For following/trying out in-book demos **as a solo learner**, it is recommended that you take the following steps to prepare yourself for exploring **MS Excel Bootcamp**, and for going through the content in this book. *Instructors using the book may have other requirements instead.*

NOTE: Mac Users will have a different experience with the Excel for Mac user interface, and while this book does offer some tips on this, it is primarily directed toward MS Excel for MS Windows/Office for PC.

ACTION: Preparation steps for using this content

If your instructor uses this textbook and has their own file naming/saving standards, then use that. Otherwise, on your own computer, in a location you can easily find, **create** a file directory called **EXCEL_BOOTCAMP**.

- In this directory, create 3 (three) sub folders: **Examples, Images, DataFiles**
- Use the **Examples** folder to save your explorations, activities, and activities in this book.
- Use the **Images** folder for any images you choose to use in your work, any screenshots you take as you learn, and notes of image attributions.
- Use the **DataFiles** folder for any textbook or other Excel working files you download to use while working with this book. You want to keep only the *Original* downloaded files here, so that you can reuse them when you rename/save a working copy to your ***Examples*** folder for actual textbook activities work.
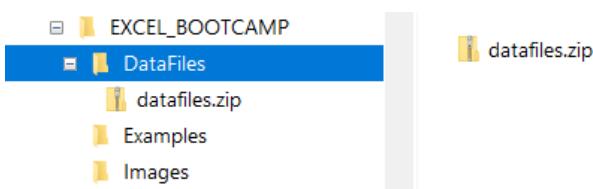
MedAttrib: author-generated. Recommended learner file directory organization.

- Download the **datafiles.zip** Zip file and

save it into your new **DataFiles** folder
- Extract the data files from the Zip file and also save them in the same **DataFiles** folder.
- When you need a working Excel file for a textbook activity, <u>make a copy</u> of it with a new chapter-related file name and place that copy in your **Examples** folder. This way you still have the original file in your *DataFiles* folder while being able to work safely on a file for a textbook activity in your **Examples** folder.

TIP: Zip files. You can use the free built-in operating system, or 7-Zip, PEAZip, or file applications, which should work for all computer types (PC, Mac, Linux). You should be able to extract files from the zipped datafiles.zip folder for use.

Regularly **SAVE** your practice work and your activities in your **Examples** folder (*unless you have an instructor who has other instructions*). Saving regularly is one of the most useful and time/aggravation-saving things you can do for

yourself. The textbook regularly notes "**SAVE your work**" several times in an activity to prompt and built this good/stable habit. *It can also be used as a good assessment place for taking a screenshot of accomplished work if you or an instructor wishes to see your progress in that way.*

Part 1: Fundamental Skills

Microsoft® Excel® is a tool that can be used in virtually all careers and is valuable in both professional and personal settings. Whether you need to keep track of music selections in an online shop or create a financial plan for your budget, Excel enables you to do these activities efficiently and accurately. This section of chapters introduces the fundamental skills necessary to get you started in using Excel and to a solid intermediate level of competence, confidence, and comfort using the application. You will find that just a few skills can make you very productive in a short period of time.

While this content refers to Excel, the skills you learn and practice here are consistent with *other* open-source and other variations of spreadsheet programs, like Libre Office, Google

Sheets, etc. However, Excel – as covered in this content – is a robust, supported, and frequently tweaked/updated application that is part of the integrated Microsoft® Office® suite. Also, this content will focus on a full installation of the complete program, not the light/free version that is offered online. This is because the full version has many tools and activities that the lighter online version, and mobile app versions, may not support. However, you can scale your skillsbuilding work on Excel to use the lighter versions with what you do learn and practice here.

Chapter 1: Microsoft Excel Overview

- Excel Prep
- Excel for Windows and Mac
- The Excel Workbook
- Navigating Worksheets
- The Excel Ribbon
- The File Backstage
- Right-click Menus
- Saving Workbooks
- The Status Bar
- Excel Help

Microsoft® Office contains a variety of tools that help people accomplish many personal and professional objectives. Microsoft Excel is a versatile and widely used program in all the Office applications, and a lot of job descriptions

specifically mention it as a core skillset. No matter which career path you choose, you will likely need to use Excel to accomplish your professional objectives, some of which may occur daily. This chapter provides an overview of the Excel application along with an orientation for accessing the commands and features of an Excel workbook.

As workflow develops to include more automation, data analysis tools, and more of a focus on business informatics, Excel is modifying into a more robust tool. Aspects of its functionality, including contents and tasks on various toolbar/ribbons, will continue to change and add more options for intermediate-to-advanced work, such as more automation, power queries, and AI-assisted analysis with CoPilot. We are not covering these in this textbook.

Excel Prep

Microsoft® Excel® is a 'spreadsheet' program/application. Spreadsheets tend to be

applications for mainly quantitative information (analysis, computations) although many spreadsheets may not actually compute anything at all.

Taking a very simple view, Excel is a tool that allows you to enter quantitative data into an electronic spreadsheet to organize it and to apply one or many mathematical computations. These computations ultimately convert that quantitative data into information for data analysis and decision-making. The information produced in Excel can be used to make decisions in both professional and personal contexts. For example, employees can use Excel to determine how much inventory to buy for a small business retailer, to calculate grades for students in a course, or how much money to spend to stay within a budget. With respect to personal decisions, you can use Excel to determine how much money you can spend on a home, how much you spend on car lease payments, or how much you need to save to reach your retirement goals. So, let's get started!

Starting the Excel application

- This content will focus on the **full installation** of the complete Excel application on a computer setup, such as your home desktop machine, your travelling laptop, and workplace / school use from server installations. The process for using Excel Online and mobile device smaller Excel apps will be different and not focused on here.
- **Note**: Spreadsheet = worksheet, or workbook (file with one or more worksheets)

ACTION: Try Me activity

- Locate **Excel** on your computer. This can be done with your computer's search tool so that you can locate the application icon.
- Click Microsoft Excel icon/execution file to launch the Excel application. You will then be presented with workbook options to help get you started.
- Options will include a Blank workbook,

tours of program information, templates installed with your application, and the choice of opening an existing Excel file.

- New Excel workbooks start with a blank file of worksheet(s) – which are like tabbed pages for you to start new work.
- Existing files can be opened from your computer, an external drive, and an online source like OneDrive (if you have/use that).
- For now, choose **Blank Workbook**, which should open a new, blank workbook with a default of 3 *Sheet* tabs.

Excel for Windows vs Excel for Mac

The Excel for Windows and Excel for Mac software versions are very similar, although the Mac version can be a little behind in all the options and features available and may use different names/phrasing. Most of the features, tools and commands are available in both versions. There are, however, some differences with the Excel interface. There are also a few features that are not available in the Excel for

Mac version. The screenshots and step-by-step instructions in this textbook are *specific to Excel for PC Windows*. This book attempts to provide alternate screenshots and instructions for the Mac version when the differences are significant, and if there is no Mac Users option mentioned the steps should be the same as for PCs.

TIP: Microsoft Updates. Information/MS features can and do routinely change as the current SaaS online application version adjusts the MS Office programs when Microsoft makes modifications.

The Excel Workbook

A workbook (spreadsheet file) is an Excel file that contains one or more worksheets (which are like separate pages in a file folder). Excel will assign a default file name to the workbook, such as **Book1**, **Book2**, **Book3**, and so on, depending on how many new workbooks are opened. ***See image below.***

The images below show a blank workbook after starting Excel and choosing **Blank workbook**. Take some time to familiarize yourself with this screen. Your screen may be slightly different based on the version you're using.

TIP: Excel for Mac. This textbook won't usually have comparison images for Excel for the Mac. However, if you have trouble finding something, use the Excel for Mac HELP area to ask and the program should link to Excel for Mac information to help you.

When your workbook opens, it should open with a default of 3 worksheets (named **Sheet1, Sheet2, Sheet3**) and you will be on the first **worksheet**. Your worksheet should already be maximized (or shown at full size) once Excel is started. However, if your screen looks it is undersized after starting Excel, you should click the maximize button.

Your worksheet has various spaces to keep in mind.
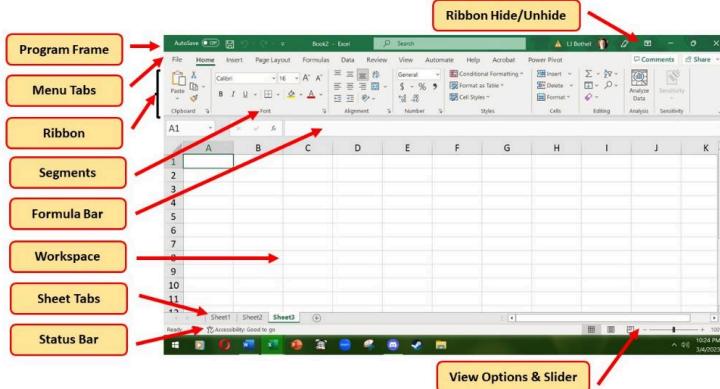
MedAttrib: author-generated. MS Excel for Windows User Interface.
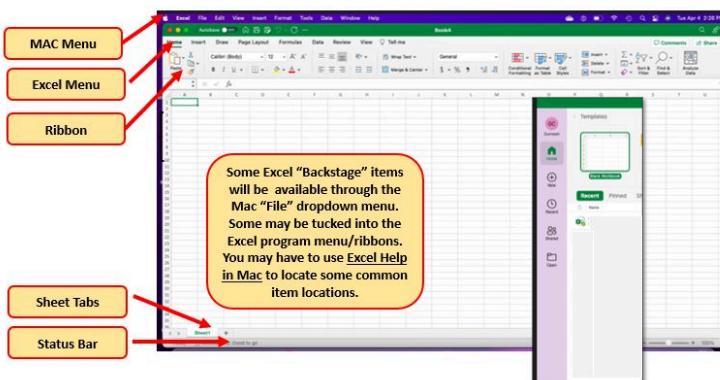
MedAttrib: author-generated. MS Excel for Mac User Interface.

- The program frame, which in Excel is usually medium green in color, has a top

bar which will show the name of the workbook, the Quick Access Toolbar (if you use one), a search bar, and some application window sizing (minimize, full size, and exit) buttons. *Note that recent updates to MS Office 365 may default the program frames to white, not green.*

- The menu bar, which shows menu items (like Home), will also display a contextual **ribbon** of tool icons below it.
- A bar that shows a **cell address** field, a **function selector** area, and the **formula bar,** which displays the content of active worksheet cells and also formulas you use.
- The worksheet working space, which by default shows the faint outlines of cells that make up rows and columns. The working space also shows a **tab** at the bottom of it that will be where you can rename the active worksheet. More than one tab indicates that you have more than one worksheet in your workbook file.
- A Status Bar at the bottom of the application displays Excel messages, viewing options, and a slider to increase or decrease the magnification of the

worksheet's working space. This can be customized.

Navigating Worksheets

In Excel, spreadsheet files are called **workbooks**, and their native saved format will be **.xlsx**. An Excel workbook contains tabbed pages called **worksheets**. A worksheet is like a section in a file folder and can also feel like a page, and a worksheet itself can actually have many **pages** once printed out or saved in a PDF. On the screen the worksheet will present as a single ongoing document with many columns (fields) and rows (records) of **cells** in which to add and work with data.

Data are entered and managed in cells by entering numeric and non-numeric data. Each cell in an Excel worksheet contains an identification address, which is defined by a **column letter** followed by a **row number**. For example, the top left cell **A1**. This would be referred to as cell location **A1** (or cell reference **A1**) – *Column A Row 1*. You can navigate in an

Excel worksheet with your mouse pointer or using the arrow buttons on your keyboard.

- In the blank workbook, place your mouse pointer over cell **A1** and click.
- Check to make sure column letter A and row number 1 are highlighted – they should appear a slightly different intensity of gray than the rest of the column and row address segments.
- Look at the application's upper left field (below the ribbon) where you should see A1 in the **Name Field**.
- Move the mouse pointer to cell **D6**.
- Click and hold the left mouse button and drag the mouse pointer back to cell A1.
- Release the left mouse button. You should see several cells highlighted because you 'selected' them. IF you have trouble holding and dragging, you can instead select cell A1, then press and hold the Shift key, then click the cell D6. This will also select the same set of cells. They will be

cells **A1-D6.**

This is referred to as a **cell range** and would be documented in formulas and reference as: **A1:D6**. Any two cell locations separated by a colon are known as a cell range. The first cell is the top left corner of the range, and the second cell is the lower right corner of the range. *This is important because cell ranges will be an important part of formulas later on.*

TIP: Cell Ranges in this book. This book will refer to cell ranges as Cells XX-XX, or Cells XX through XX when you need to take some action. When you see Cells XX:XX, that usually refers to how Excel shows the range reference in a formula/ function.

Keyboard Shortcuts > Worksheet Navigation

- Use the arrow keys on your keyboard to select (activate) cells on the worksheet.
- Hold the SHIFT key and press the arrow keys on your keyboard to highlight a range

of cells in a worksheet.
- Hold the CTRL key while pressing the PAGE DOWN or PAGE UP keys to open other worksheets in a workbook.
- **Mac Users:** Hold down the Function (Fn) and CMD keys and press the left or right arrow keys

The Excel Ribbon

Excel's features and commands are found in the Ribbon, which is the upper area of the Excel screen that contains several menu tabs running across the top. Each tab provides access to a contextual set of Excel commands. *In this book, Ribbon, Ribbon Tabs, and Menu will be used interchangeably, as they often are in a workplace.*

- The older dropdown menu structure is still available with Excel for **Mac**.
- The specific commands and tools within each tab are slightly different between the two Excel ribbons. Some of the commands found within the Excel for Windows ribbon

tabs are located within the dropdown
menu structure in the Excel for Mac
version. So, if you can't find the tool on the
Excel for Mac ribbon, then try to find the
tool by looking through the dropdown
menu instead. You may also need to
Google to ask.
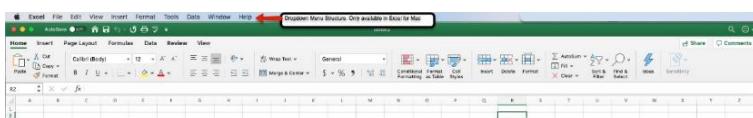
MedAttrib: Beginning to Intermediate Excel.
MS Excel Ribbon.

Group title names on the Excel menu ribbon

If you look closely at the Excel ribbons/tabs you
will see that the ribbon is separated in groups
of tool buttons, and each group has a title
name. For instance, on the **Home** ribbon/tab,
the group title names are "Clipboard", "Font",
"Alignment", "Number", "Styles". "Cells,"
"Editing", etc. The tool buttons within each
group are all related to the group title. *In this*

book, instructions will usually point you to the Ribbon/Tab and specific Group name to help you find the right icon / command to use. Ribbon and Tab will be used interchangeably.

Mac Users: The default "View" for the Excel for Mac ribbon **does not display** these group title names. It is a good idea to change this view so you can see the group title names. Here are steps.

- Click the **Excel menu** option at top left above the ribbon
- Choose **Preferences**
- Click the "**View**" button
- Scroll down and check the box for **Group Titles**
- Close the View dialog box. The group title names should now display as shown above

Overview for each tab of the ribbon

- **File**: Also known as the Backstage view of the Excel workbook (Windows PC).

Includes all commands for opening, closing, saving, and creating new Excel workbooks. Includes print commands, document properties, e-mailing options, and help features. The default settings and options are also found in this tab. *MAC users will have to find these spread out in different ribbons (such as File/Preferences) and in the Apple menu for the program.*

· **Home**: Includes the most frequently used Excel commands. Formatting commands are found in this tab along with commands for cutting, copying, pasting, and for inserting and deleting rows and columns.

· **Insert**: Used to insert objects such as charts, pictures, shapes, tables, Pivot tables, Internet links, symbols, and text boxes.

· **Page Layout**: Includes commands used to prepare a worksheet for printing/distribution. Also includes commands used to show and print the gridlines on a worksheet.

· **Formulas**: Includes commands for adding mathematical functions to a worksheet.

Also contains tools for auditing mathematical formulas.

- **Data**: Includes commands used when working with external data sources such as Microsoft® Access®, Azure, text files, or the Internet. Also contains sorting commands and access to scenario tools.
- **Review**: Includes Spelling and Track Changes features. Also contains protection features to password protect worksheets or workbooks.
- **View**: Used to adjust the visual appearance of a workbook. Common commands include the Zoom and Page Layout view.
- **Automate**: This is a fairly new ribbon designed for tasks that use scripts and macros. Good for large spreadsheet work, not covered in this book.
- **Help**: Provides access to help and support features such as contacting Microsoft support, sending feedback, suggesting a new feature, and community discussion groups. *This tab is not available with Excel for Mac.*
- **Draw**: Provides drawing options for using a digital pen, mouse or finger depending on

the type of device (laptop with touch screen, tablet, computer, etc.). *This tab is not visible by default and this book does not cover it*. See below on how to customize the ribbon to add or remove tabs.

- **Developer**: Provides access to some advanced features such as macros, form controls, and XML commands. *This tab is not visible by default and this book does not cover it*.
- See below on how to customize the ribbon to add or remove tabs.

The ribbon defaults to full, or maximized. The benefit of having a full ribbon is that the commands are always visible while you are developing a worksheet. However, depending on the screen dimensions of your computer, you may find that the ribbon takes up too much vertical space on your worksheet. If this is the case, you can minimize the ribbon by clicking the Ribbon Display Options button at the top near right of the application; *a recent update has changed this to let you choose Full Screen mode, which you can exit by electing*

three dots at the upper left of the screen to show other Screen View options for the ribbons/tabs. When minimized, the ribbon will show only the tabs and not the command buttons. When you click on a tab, the command buttons will appear until you select a command or click anywhere on your worksheet, then the ribbon will hide again.

Keyboard Shortcuts > Minimizing or Maximizing the ribbon. Toggle: Hold down the CTRL key and press F1 key. Mac: CMD and Option keys and press R to minimize, and do this again to maximize.

The File Backstage

The File tab (on the MS Windows PC operating system) is also known as the **Backstage** view of the workbook. It allows you to do tasks related to the management of your file. It does not display a ribbon like the other menu tabs. Instead, it includes a left-hand bar that shows a variety of features and commands related to

the workbook that is currently open, to new workbooks, and/or to workbooks stored in other locations on your computer or network. To leave the Backstage view and return to the worksheet, click the arrow in the upper left-hand corner.

MAC USERS: You can find some of this same information – though it will look different – by accessing your Excel File/Preferences option, and selecting from the choices there.
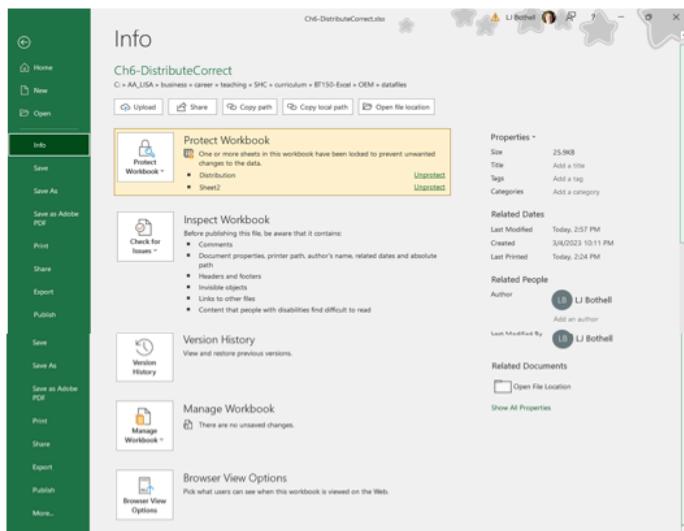
MedAttrib: author-generated. MS Excel for Windows PC OS Backstage Info page.

NOTE: *Mac users do not have this same Backstage view.* Instead, they will need to look for related items using their Apple menu's Excel area, and other Excel ribbon tabs – like for preferences, views, etc.

MAC Panels
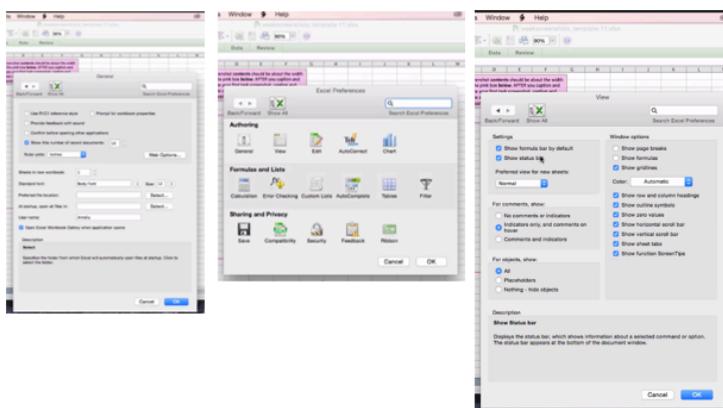
MedAttrib: author-generated. MS Excel for Windows MAC OS Info panels.

ACTION: Try Me, continued.

Included in the File tab are the default settings for the Excel application that can be accessed and modified by clicking the Options button, which may be hidden and require you to select "more" at the bottom of the left-hand menu

to see the choice for Options. This shows the Excel Options window, which gives you access to settings such as the default font style, font size, and the number of worksheets that appear in new workbooks.

Excel has a number of defaults that the program starts with, and you can change these as you become familiar with the way you would like to work with your files, such as how you would like to view, save, backup, and set other standards. *You need to explore this for yourself to get familiar with what is available*
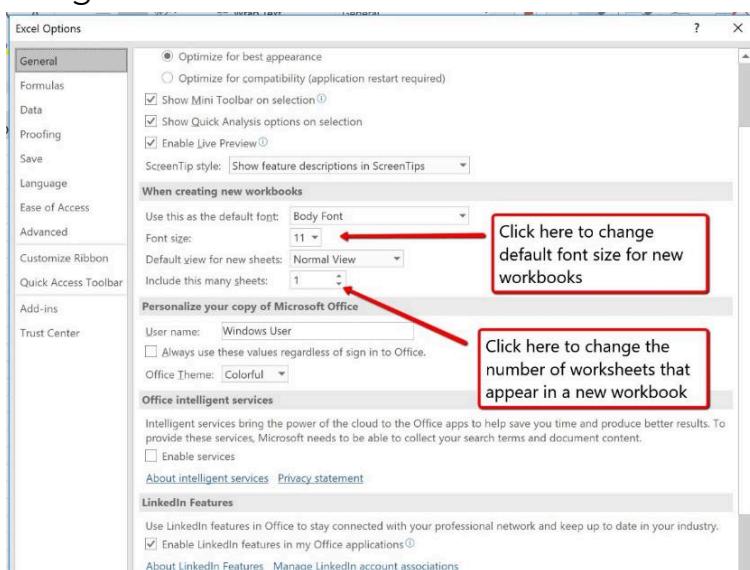
MedAttrib: Beginning to Intermediate Excel. MS Excel Options Window for Windows PC.

Mac Users: *To access these same options in Excel for Mac, you need to click the "Excel" menu option and choose "Preferences."*

Customize the Excel ribbon

You can customize the Excel ribbon for any or all of the menu tabs; however, unless you are a proficient power-user of Excel, this is **not** recommended because you may move or hide important things and need to reset the Ribbon to default to find them again. The instructions below will also work for customizing the **Quick Access Toolbar**, which shows in the top green bar of the Excel Application if there are selections in it. The Quick Access Toolbar is more nimble and less risky to personalize than the actual program ribbons.

Here are the steps to add additional tabs to the Excel ribbon:

- Click the **File** tab and choose More (if

needed) Options

- Click on "Customize ribbon" (or Customize
  Quick Access Toolbar) at the left side of the
  Options screen
- Click the checkbox next to the Tab name
 that you want to add.
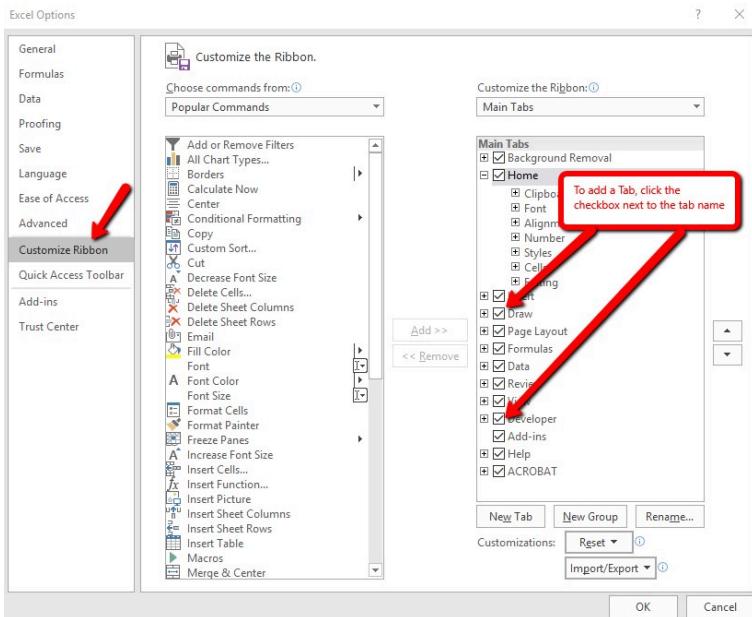
MedAttrib: Beginning to Intermediate Excel.
MS Excel Customizing the ribbon.

Quick Access Toolbar

The **Quick Access Toolbar** is found at the upper left side of the Excel screen above the ribbon. This area provides access to the most frequently used commands, such as Save and Undo. You also can customize the

Quick Access Toolbar by adding commands that you use on a regular basis. By placing these commands in the Quick Access Toolbar, you do not have to navigate through the ribbon to find them. To customize the Quick Access Toolbar, use the same process as for customizing the ribbon, which will open a menu of commands that you can add to the Quick Access Toolbar. If you do not see the command you are looking for on the list, select the More Commands option.
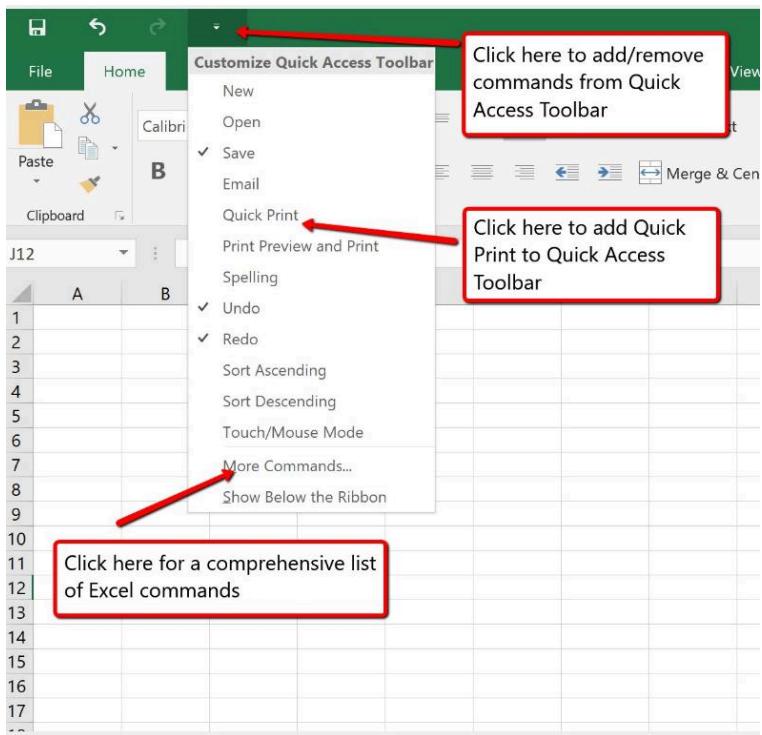
**MedAttrib:** Beginning to Intermediate Excel. MS Excel Customizing the Quick Access Toolbar.

Right-Click Menus

In addition to the ribbon and Quick Access Toolbar, you can also access many commands by right clicking anywhere on the worksheet,

which will enable a dropdown menu (often contextual) of choices that are relevant to what you need to accomplish.

Mac Users: There is no "Right-click" option for Excel for Mac. Instead, hold down the Control key and click the mouse button.
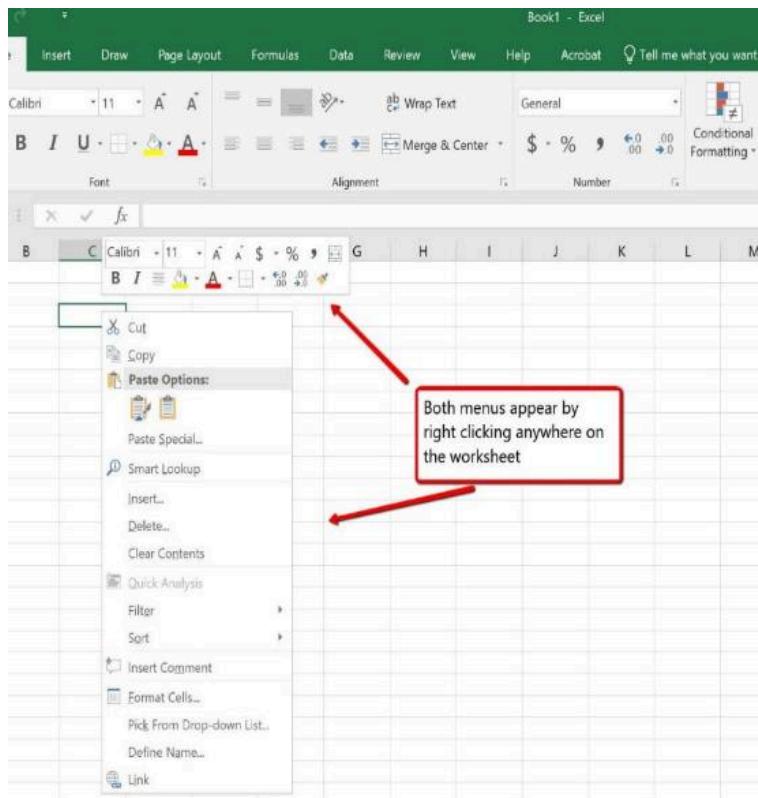
MedAttrib: Beginning to Intermediate Excel. MS Excel's Right-Click dropdown menu.

Saving Workbooks

Once you create a new workbook, you will need to change the file name and choose a location on your computer or network to save that file. It is important to remember where you **SAVE your work**books, so that you can easily find them again. The process of saving can be different with different versions of Excel. Please be sure you follow the steps for the version of Excel you are using. The following steps generally explain how to save a new workbook and assign it a file name.

TIP: Save Work Immediately and Often. BEFORE you do any work in a new workbook, make a habit of naming and saving your file right away so that you can find it again easily if interrupted or if some technical glitch happens while you are working. Then SAVE your work frequently so your changes are updated and saved. The Quick Access Toolbar shows a little disk icon, and the common keybind is CTRL S / Mac: CMD S.

- If you have not done so already, open a blank workbook in Excel.
- Click the File tab and then the **Save As** button in the left side of the Backstage view window. This will open the **Save As** dialog box.
- Determine a location for saving on your computer by looking for and clicking the **Browse button** to open the **Save As** dialog box.
- Click in the File Name box near the bottom of the **Save As** dialog box. I recommend you give the file a name such as: *Ch1-ExcelIntro.docx*

- Review the settings in the screen for correctness and click the **Save** button.

TIP: Save Locations. It is <u>not</u> good to use the default save location in Excel. A professional tip is that you should get into the habit of setting up a directory on your hard drive which allows you to save important documents. And/or get into the habit of saving your documents with the other documents of any project / course / workspace you set up for your workflow, like the files for the same class, or files for the same accounting client, etc.
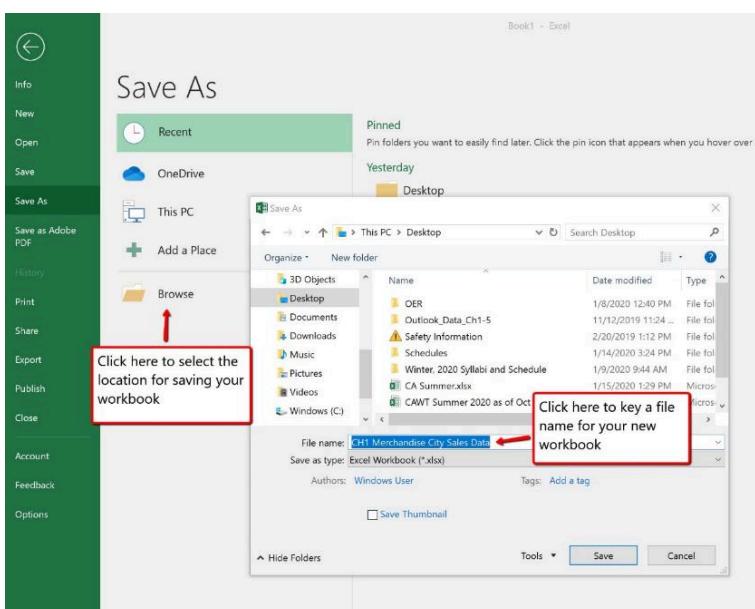
MedAttrib: Beginning to Intermediate Excel. MS Excel's Save As Dialog entries.

Keyboard Shortcuts > Save. CTRL S / Mac CMD S

The Status Bar

The Status Bar is located below the worksheet tabs on the Excel screen. It displays a variety of information, such as the status of certain keys on your keyboard (e.g., CAPS LOCK), the available views for a workbook, and the magnification of the screen. You can customize the Status Bar as follows:

- Place the mouse pointer over any area of the Status Bar and right click to display the "Customize Status Bar" list of options.
- Mac Users: use "Control-click" on the Status Bar to display the "Customize Status Bar" options.
- Select your preferred option from the menu.
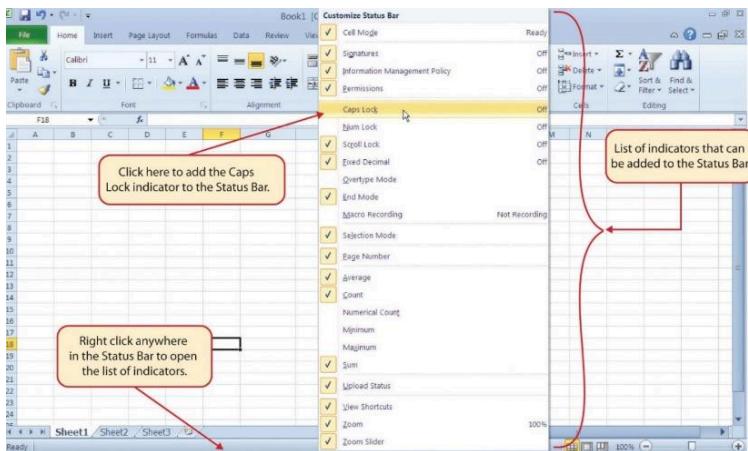
MedAttrib: Beginning to Intermediate Excel. MS Excel's Customizing the Status Bar.

Excel Help

The Excel Help feature provides extensive information about the Excel application. Although some of this information may be stored on your computer, the Help window will automatically connect to the Internet, if you have a live connection, to provide you with resources that can answer most of your questions. You can open the Excel Help window by clicking the question mark in the upper right area of the screen or ribbon. With

newer versions of Excel, use the query box to ask your question and select from helpful option links or select the question mark from the dropdown list to launch Excel Help windows.
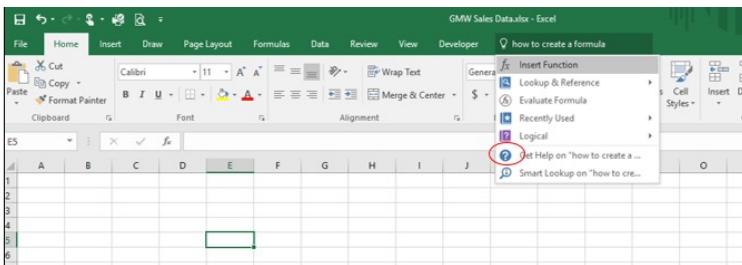
MedAttrib: Beginning to Intermediate Excel. MS Excel's Help Window.

Keyboard Shortcuts > Excel Help. F1 key.

Chapter 2: Data Input / Editing

- Entering Data
- Editing Data
- Auto Fill
- Deleting Data
- Adjusting Columns/Rows
- Hiding and Unhiding Columns/Rows
- Inserting Columns/Rows
- Moving Data
- Deleting Columns/Rows

In this section, we will begin the development of a worksheet. The skills covered in this section are typically used in the early stages of creating one or more worksheets in a workbook.

Part of what we will cover here is inputting data. However, Excel can import data from other sources, like databases and other

programs. We will look at data imports in Part 2. For now, we are simply getting used to the basics of Excel with more straightforward files and data input.

Let's clarify what data in Excel actually means. The contents of any cell are referred to as the value in that cell – whether it is qualitative text or the quantitative returned information from a formula. Values in Excel include:

- **Text**: Plain text is static. It contains some combination of letters, numbers, spaces, and symbols. It is descriptive/ informational, and in itself doesn't provide the values of a formula. Text remains constant when it is used in a formula.
- **Number**: Numbers are data that is acted upon in formulas. They can be formatted to be different kinds of numbers, like currency, percentages, etc. They are what most formulas calculate with in order to give an answer and/or transform their meaning.
- **Logical**: Data in this type is either TRUE or FALSE, usually as the result of a test or comparison from a formula.

- **Error**: A value that returns if a formula cannot complete calculations properly.

Entering Data

Entering data in Excel is very unlike the type and enter experience you may have with word processing documents, presentation files, and web page text entry fields. Excel basically has to use information in little pieces in order to calculate with it, sort it, filter it, and otherwise analyze it. For instance, if you type a person's name and address all in one line or worksheet cell, it can only be sorted by the very first letter, not the address, or zip code, or last name, etc.

This means that you will need to become comfortable with using cells, which is the medium with which Excel can identify pieces of data and use them.

Columns of cells tend to be referred to as fields of information. Rows of cells ten to be referred to as records of data. So:

- A person's first name in a column is an

entry in the column's field. A column can have multiple fields (instances) of data, like a column of first names in a range of data. In the image below, Column A fields contain first names, like L.J., Alfre, Jonna, etc.

- A person's row of information, like first and last name, email address, and favorite dessert, is a record for that one person. A data range is usually made up of many records. In the image below, the Row 1 record contains data like Ajay Bashira apple juice, etc.

ACTION: Try Me activity

- Follow along and try things. There is no "wrong", this is just play and exploration!

	A	B	C	D	E
1	Fname	Lname	DrinkBudget	Beverage	Month
2	L.J.	Bothell	50	Mocha	January
3	Alfre	DuShayne	75	Root beer	February
4	Jonna	Mills	180	Cocio	March
5	Patrick	McNeill	65	Sweet tea	April
6	Julio	Mendez	48	Chai Latte	May
7	Ajay	Bashira	125	Apple Juice	June
8					

MedAttrib: author-generated. MS Excel cells, rows, and columns.

Plain Data

- **BEFORE** you do this activity, make sure you have taken the Preparation Steps in the Part 1 Introduction of this book – about creating file folders on your computer and downloading available files for later use. *OR, if you have an instructor who requires other file folder organization and file naming standards, <u>do that instead</u>.* Either way allows you to have a safe place to save your files of work while

you explore this content – your Examples folder.

- Once you have a storage space to save your work, **Create** a new, blank workbook in Excel.
- Immediately give it a name and save it to your chosen working directory folder on your computer. File naming recommendation: **Ch2-DataEntry.xlsx.**
- Click cell **A2**.
- Type **your own <u>first</u> name** in cell **A2**, then press the ENTER key. After you press the ENTER key, cell **A3** will be activated. Using the ENTER key is an efficient way to enter data vertically down a column.
- Enter the following first names, pressing ENTER after each: A3=**Alfre**, A4=**Jonna**, A5=**Patrick**, A6=**Julio**, A7=**Ajay**
- Click cell B2.
- Type **your own <u>last</u> name** and press the ENTER key. After you press the ENTER key, cell **B3** will be activated.
- Type the name DuShayne into cell B3 and press the ENTER key. Do this with the rest of the names through cell B7: **Mills, McNeill, Mendez, Bashira**

- Click cell **C2**.
- Type the number **50** and press the ENTER key.
- Enter the following numbers in cells C3 through C7: **75, 180, 65, 48, 125**
- **SAVE your work as you go**: the Quick Access Toolbar shows a little disk icon, and the common keybind is CTRL S / **Mac**: CMD S.
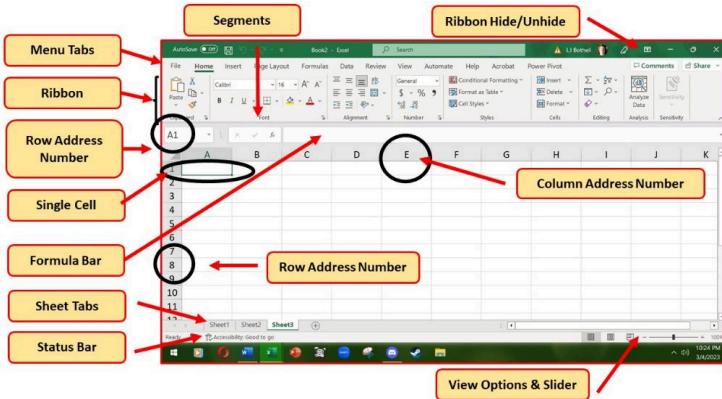
MedAttrib: author-generated. MS Excel cells, rows, and columns.

TIP: Avoid formatting symbols when typing numbers. When typing numbers into an Excel worksheet, it is best to avoid adding any formatting symbols

such as dollar signs and commas – just type in the numeric data itself. Although Excel allows you to add these symbols while typing numbers, it slows down the process of entering data. *It is more efficient to later use Excel's formatting features to add these symbols to numbers after you type them into a worksheet.*

Column Headings

In Excel, data rarely means anything to a user if there is no context attached to it. Commonly this is done through column headings, which identify what the content in the column is supposed to be. This can also be done as row headers instead, but in this course we'll mostly use the standard column headings.

In the image above, you likely also saw a row of bold text in cells A1-C1. These are column headers, and you can type them:

- In cell **A1**, type **Fname**, then press TAB. Tab lets you move to the right of an active cell

and activate the next one to its right for data entry.

- In cell **B1**, type **Lname** and press TAB.
- In cell **C1**, type **DrinkBudget**, and press TAB.
- In cell **D1**, type **FaveDrink,** and press TAB.
- In cell **E1**, type **Month** and press TAB.

These are the column headings that tell you the first column is full of first name fields, the second column is full of last names, and the third column has amounts for a coffee budget, etc.

Editing Data

Data that has been entered in a cell can be changed by double clicking the cell location or by selecting the cell but typing data into the Formula Bar. You may have noticed that as you were typing data into an cell location (like A2), the data you typed also appeared in the Formula Bar. The Formula Bar can be used for entering data into cells as well as for editing data that already exists in a cell. The following

steps provide an example of entering and then editing data that has been entered into a cell location:

- Click cell **D2**.
- Type **Moc** and press the ENTER key.
- Click cell **D2** again to select it.
- Move the mouse pointer up to the Formula Bar. You will see the pointer turn into a cursor. Move the cursor to the end of the abbreviation **Moc** and left click.
- Type the letters **ha** to complete the word **Mocha**.
- Click the check mark to the left of the Formula Bar. This will enter the change into the cell.
- Use this method – clicking a cell but typing into it through the Formula Bar – to add coffee beverages you see in the Try Me image (above) into cells **D3-D7**.
- **SAVE your work as you go**: the Quick Access Toolbar disk icon, and keybind is CTRL S / Mac: CMD S.

Keyboard Shortcut: Editing Data in a Cell. Activate the cell that is to be edited

and press the F2 key.

Auto Fill

The Auto Fill feature is a valuable tool when manually entering data into a worksheet. It is sometimes referred to as Smart Fill. This feature has many uses, but it is most beneficial when you are entering data in a defined sequence, such as the numbers 2, 4, 6, 8, and so on, or nonnumeric data such as the days of the week or months of the year. It does not work for all seemingly consistent series – just for simple ones.

The following steps demonstrate how Auto Fill can be used to enter the months of the year in column E:

- Click cell **E2** in the Sheet1 worksheet.
- Type the word **January** and press the ENTER key.
- Click cell **E3** and type **February**, then Press Enter.
- Click cell **E4** and type **March**, then Press

Enter.

- Move the mouse pointer to the lower right corner of cell **E4**. You will see a small square in this corner of the cell; this is called the Fill Handle. When the mouse pointer gets close to the Fill Handle, the white block plus sign will turn into a black plus (+) sign.
- Left click and drag the Fill Handle down through cell **E13**. Notice that the Auto Fill tip box indicates what month will be placed into each cell. Release the mouse button when the tip box reads "**December**."

Once you release the left mouse button, 12 months of the year should appear in the cell range **E2:E13**. You will also see the Auto Fill Options button. By clicking this button, you have several options for inserting data into a group of cells.

- **SAVE your work as you go**: the Quick Access Toolbar disk icon. Keybind is CTRL S / MAC: CMD S.

Deleting Data

There are several methods for removing data from a worksheet, and with each method, you use the Undo command if you change your mind. This is a helpful command in the event you mistakenly remove data from your worksheet.

You can delete data by selecting a cell and using your keyboard's Delete button. You can right-click on a cell and choose Delete. You can select a cell and use the Home tab Editing group and choose the Clear icon, then Clear all.

- Select Cells **E8 through E13**.
- Press the **DELETE** key / **Mac** FN key + Delete. This deletes the contents of those cells.
- So that we can recover that information, click the **Undo** button – which is by default available in the Quick Access Toolbar. This should replace the data in the cells **E8-E13**.
- To re-delete the info, Use the Home tab Editing group and choose the **Clear** icon, then **Clear all**.

Keyboard Shortcut: Undo. CTRL key + Z key / Mac CMD key + Z key.

Adjusting Columns/Rows

TIP: Column and Row Addresses. Every row has an address – the gray "cell" number to the left of the editable part of your worksheet. Every Column has one too, the gray "cell" letter just above the editable part of your worksheet. You click on these to select a whole row or column.

There may be a few entries in a worksheet that appear cut off. This is because the column is too narrow for the contents. The columns and rows on an Excel worksheet can be adjusted to accommodate the data that is being entered into a cell using different methods. The following steps explain how to adjust the column widths and row heights in a worksheet.

- Bring the mouse pointer between **column**

A and **column B** in the Sheet1 worksheet. You will see the white block plus sign turn into double arrows.

- Click and drag the column edge to the right so the entire column looks like it is about 2 inches wide. As you drag the column, you will see the column width tip box. This box displays the number of characters that will fit into the column using the Calibri 11-point font which is the default setting for font/size. If you are using a different font size as a default, then you will have a wider column as a result.
- Release the left mouse button.

You may find that using the click-and-drag method is inefficient if you need to set a specific character width for one or more columns. This is a second method for adjusting column widths when using a specific number of characters:

- Click any cell location in column A by moving the mouse pointer over a cell location and clicking the left mouse button. You can highlight cell locations in

multiple columns if you are setting the
same character width for more than one
column.

- In the Home tab of the ribbon, left click
  the **Format** button in the Cells group.
- Click the **Column Width** option from the
  drop-down menu. This will open the
  Column Width dialog box.
- Type the number **29** and click **OK** on the
  Column Width dialog box. This will set
  column A to this character width.

A third method is the double-click one:

- Once again bring the mouse pointer
  between **column A** and **column B** so that
  the double arrow pointer displays ,and
  then <u>double-click</u> to activate AutoFit. This
  features adjusts the column width based
  on the longest entry in the column.

Row Height adjustment works similarly. Steps
1 through 4 demonstrate how to adjust row
height, which is similar to adjusting column
width:

- Click cell **A1**.

- In the Home tab of the ribbon, left click the **Format** button in the Cells group.
- Click the **Row Height** option from the drop-down menu. This will open the Row Height dialog box.
- Type the number **24** and click **OK** on the Row Height dialog box. This will set Row 1 to a height of 24 points. A point is equivalent to approximately 1/72 of an inch. This adjustment in row height was made to create space between the totals for this worksheet and the rest of the data.

Now, to adjust the row with the autofit option:

- Bring the mouse pointer between **row 1** and **row 2** so that the double arrow pointer displays, and then <u>double-click</u> to activate AutoFit. This features adjusts the row width based on the largest entry in the row.
- **SAVE your work as you go**: the Quick Access Toolbar disk icon, and keybind is CTRL S / Mac: CMD S.

Keyboard Shortcut: Column Width. Hold

ALT key then press letters H, O, and W one at a time. Mac Users: not available.

Keyboard Shortcut: Row Height. Hold ALT key then press letters H, O, and H one at a time. Mac Users: not available.

Hiding and Unhiding Columns/Rows

In addition to adjusting the columns and rows on a worksheet, you can also hide them. This is a useful technique for enhancing the visual appearance of a worksheet that contains data that is not necessary to display but which is otherwise needed for computations and/or storage.

- Click cell **C1**.
- Click the **Format** button in the Home tab of the ribbon.
- Place the mouse pointer over the **Hide & Unhide** option in the drop-down menu. This will open a submenu of options.

- Click the **Hide Columns** option in the submenu of options. This will hide column C.

To unhide a column – *like the now hidden column C –* follow these steps:

- Select the **columns B and D**, which now seem to be right next to each other.
- Click the **Format** button in the Home tab of the ribbon.
- Place the mouse pointer over the **Hide & Unhide** option in the drop-down menu.
- Click the **Unhide Columns** option in the submenu of options. column C should now be visible on the worksheet.

Keyboard Shortcut: Hiding Columns. Hold down CTRL key while pressing the number 0 on your keyboard.

Keyboard Shortcut: Unhiding Columns. Highlight cells on either side of the hidden column(s), then hold down CTRL key & SHIFT key while pressing the close parenthesis key). MAC: Hold down

Control and Shift keys and press the number 0.

The following steps demonstrate how to hide rows, which is similar to hiding columns:

- Click **row 3**.
- Click the **Format** button in the Home tab of the ribbon.
- Place the mouse pointer over the **Hide & Unhide** option in the drop-down menu. This will open a submenu of options.
- Click the **Hide Rows** option in the submenu of options. This will hide **row 3**.

To unhide a row, follow these steps:

- Select the **rows 2-4**, which will seem to be right next to each other.
- Click the **Format** button in the Home tab of the ribbon.
- Place the mouse pointer over the **Hide & Unhide** option in the drop-down menu.
- Click the **Unhide Rows** option in the submenu of options. Row 3 will now be visible on the worksheet.

*Keyboard Shortcut: Hiding Rows. Hold down CTRL key while pressing number 9 key on your keyboard.*

Keyboard Shortcut: Unhiding Rows. Highlight cells above and below the hidden row(s), then hold down CTRL key & SHIFT key while pressing the open parenthesis key (. MAC: Hold down CTRL + SHIFT keys and press the number 9.

TIP: Hidden Rows and Columns. In most careers, it is common for professionals to use Excel workbooks that have been designed by a coworker. Before you use a workbook developed by someone else, always check for hidden rows and columns. You can quickly see whether a row or column is hidden if a row number or column letter is missing.

Inserting Columns/Rows

Using Excel workbooks that have been created

by others is a very efficient way to work because it eliminates the need to create data worksheets from scratch. However, you could realize that to accomplish your goals, you may need to add additional columns or rows of data. In this case, you can insert blank columns or rows into a worksheet. The following steps demonstrate how to do this:
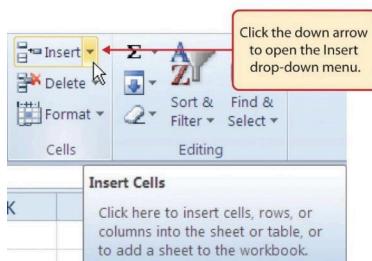
MedAttrib: Beginning to Intermediate Excel. MS Excel Insert Button (Down Arrow).

- Click cell **C1**.
- In the Home tab of the ribbon, click the down arrow on the **Insert** button.
- Click the **Insert Sheet Columns** option from the drop-down menu. A blank column will be inserted to the left of **column C**. The contents that were previously in column C now appear in *column D*. Note that columns are always inserted to the left of the activated cell.
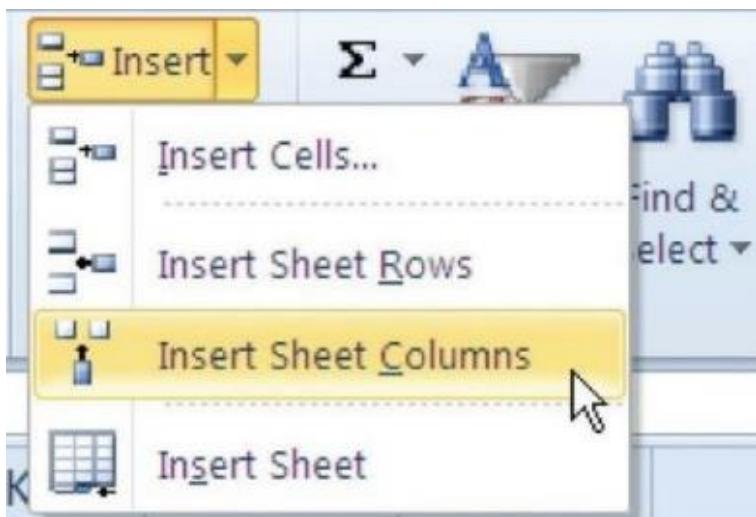
MedAttrib: Beginning to Intermediate Excel. MS Excel Insert Drop-Down Menu.

To insert a row with the same kind of process:

- Click cell **A3**.
- in the Home tab of the ribbon, click the down arrow on the **Insert** button.
- Click the **Insert Sheet Rows** option from the drop-down menu. A blank row will be inserted above **row 3**. The contents that were previously in row 3 now appear in *row 4*. Note that rows are always inserted above the activated cell.
- **SAVE your work as you go**: the Quick Access Toolbar disk icon, and keybind is CTRL S / Mac: CMD S.

Keyboard Shortcut: Inserting Columns. Press the ALT key and then letters H, I, and C one at a time. MAC: First hold down the Control key and press the spacebar to select the column; then hold down the Shift and Controls keys and press the + symbol.

Keyboard Shortcut: Inserting Rows. Press ALT key and then letters H, I, and R one at a time. MAC: First hold down Shift key and press spacebar to select row; then hold down Shift & Controls keys and press the + symbol.

Moving Data

Once info is entered into a worksheet, you have the ability to move it to different locations. The following steps demonstrate how to move data to different locations on a worksheet:

- Select the data range cells **A1-D7**.
- Bring the mouse pointer to the left edge of

cell D7. You will see the white block plus sign change to cross arrows. This indicates that you can left click and drag the data to a new location.

· Left Click and drag the selection so the upper left corner is at cell **D2**. If a context menu appears, select "Move Here"; otherwise the selection should just be moved for you.

· Release the left mouse button. The data now appears <u>starting</u> in **column D in cell D2** rather than in *column A cell A1* where it previously was.

· Click the **Undo** button in the Quick Access Toolbar (or use Ctrl+Z keyboard shortcut). This moves the data back to where it started in cell **A1**.

· **SAVE your work as you go**: the Quick Access Toolbar disk icon, and keybind is CTRL S / Mac: CMD S.

TIP: Moving Data. Before moving data on a worksheet, make sure you identify all the components that belong with the series you are moving. For example, if you are moving a column of data, make

sure the column heading is included. Also make sure you grab all of the data in the range, so you don't leave something out.

Deleting Columns/Rows

You may need to delete entire columns or rows of data from a worksheet. This need may arise if you need to remove either blank columns or rows from a worksheet or columns and rows that contain data. The methods for removing cell contents were covered earlier and can be used to delete unwanted data. To delete a column:

- Click cell **C1**.
- in the Cells group in the Home tab of the ribbon, click the down arrow on the **Delete** button.
- Click the **Delete Sheet Columns** option from the drop-down menu. This removes column C and shifts all the data in the worksheet (to the right of Column B) over one column to the left.

- Click the **Undo** button in the Quick Access Toolbar (or Ctrl + Z). This returns the column you deleted.

The same process works for deleting and undeleting a row:

- Click cell **A3**.
- In the Cells group in the Home tab of the ribbon, click the down arrow on the **Delete** button.
- Click the **Delete Sheet Rows** option from the drop-down menu. This removes row 3 and shifts all the data (below row 2) in the worksheet up one row.
- Click the **Undo** button in the Quick Access Toolbar (or use Ctrl+Z keyboard shortcut). This returns the row you deleted.

Keyboard Shortcut: Deleting Columns. Press ALT key and then letters H, D, and C one at a time. MAC: Hold down Control key and press spacebar to select column; then hold down Control key & press the – symbol.

Keyboard Shortcut: Deleting Rows. Press ALT key and then letters H, D, and R one at a time. MAC: Hold down Shift key and press spacebar to select row; then hold down Control key & press the – symbol.
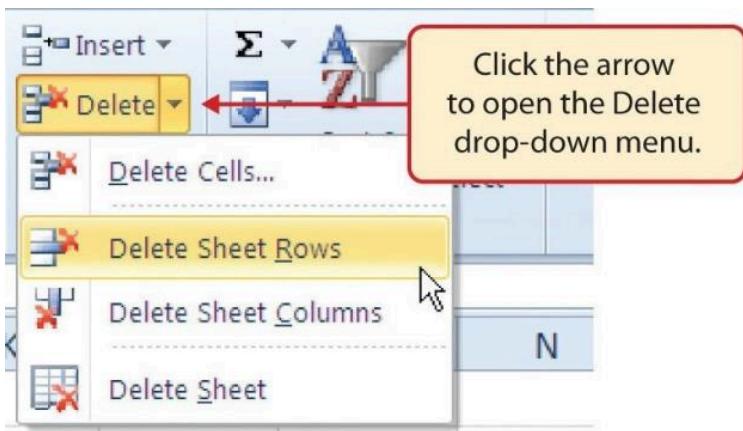
MedAttrib: Beginning to Intermediate Excel. MS Excel Delete Drop-Down Menu.

FINISHED!

- **SAVE your work** by clicking either the **Save** button on the Home ribbon; or by selecting the **Save** option from the File menu, or the Quick Access Toolbar disk icon, or the keybind CTRL S / Mac CMD S.

Chapter 3: Data - Formatting for Analysis

- Text Formatting
- Cell Merges
- Dataset Formatting
- Text Effects
- Number Formatting
- (Auto)Sum Feature

This section addresses formatting commands that can be used to enhance the visual accuracy and appearance of worksheets. It also introduces a very basic mathematical calculation. These skills will highlight how Excel can be used to prepare spreadsheets to help evaluate information and make decisions with the data.

TIP: Working with book files. In each chapter's Try Me activities, you should make a copy of the requested data file that you extract from this textbook's companion datafiles.zip folder. You should save it on your computer so you can save your changes, find it again, and reference it in the future if needed. *Learners should use this tip while working through <u>Try Me activities</u> in each chapter.*

For this chapter, we will use the data file **Ch3-Format.xlsx** in order to demonstrate the various steps. For data file download and saving information, please refer to the chapter **Book Resources** information.

Text Formatting

There are several fundamental formatting skills that will be applied to the workbook that we are developing for this chapter, like text and

number formatting, adding visual touches, a basic calculation, etc. The basic worksheet formatting tasks can mostly be found on Excel's Home menu Tab/ribbon. **Note**: this chapter focuses on the interface for the MS Windows operating system for PC, and *Mac users will likely see similar icon/commands arranged a little differently*.

The Windows for PC Excel's Home ribbon currently has 9 groups of collected commands/ icons. In this series of tasks, we'll work with the *Clipboard*, *Font, Alignment,* and *Styles* groups.
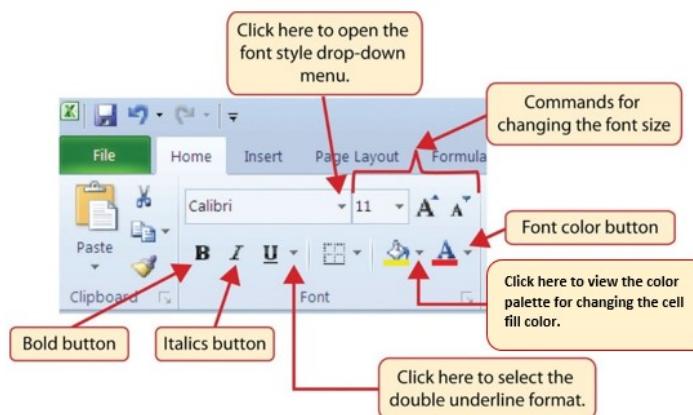
MedAttrib: Beginning to Intermediate Excel. MS Excel Font Group of Commands.

To get started, open the **Ch3–Format.xlsx** file. This is the look we will be working to accomplish:

	A	B	C	D	E	F
1			*Basic Worksheet Formatting*			
2						
3	**Fname**	**Lname**	**Address**	**City**	**Salary**	**Count**
4	Steve	Apone	123 Winter Street SE, Duplex A- 23	Arlington Heights	$44,200	1
5	Samuel	Rogers	1134 Apple Court W	Shreveport	$27,000	1
6	Jarrah	Bourke	603 Yushu Lane SE, Apt 229	Philadelphia	$24,700	1
7	Kayleigh	Carroll	1527 Cherry Road N	Savannah	$29,400	1
8	Karinya	Waters	1680 Cacao Road S	Pasadena	$50,500	1
9	Shea	Lincoln	288 Hardehout Road S, Flat 302	Dodge City	$23,000	1
10	Uba	Pierce	1192 Connifer Way S	Jackson	$36,000	1
11	Seth	Murray	1230 Frost Drive W	Columbia	$44,200	1
12	Alice	Warren	637 Rzeka Road E	New York City	$65,300	1
13	Simba	Nazari	1676 Ginger Way SW	Los Angeles	$22,800	1
14	Bowie	Ross	1457 Pomegranate Way NE	Mesa	$23,500	1
15	Douglas	MacKintosh	896 Kapok Road S	Augusta	$62,500	1
16	Luna	Rhodes	733 Kalokaíri Street E	Norwich	$44,200	1
17	Adaline	Schubert	346 Ainapua Place NW, No 429	Topeka	$73,600	1
18	Kevin	Lopez	1216 Figtree Avenue S	Willmington	$29,000	1
19	Anani	Misipeka	1330 Spring Place NW	Peoria	$65,300	1
20	Orion	Pappas	129 Fir Drive NE, Apt 29	Indianapolis	$28,600	1
21	Nolan	Ross	311 Lich Road N, Unit 325	Brownsville	$36,000	1
22	LJ	Bothell	101 Snorkeling Beach	Honolulu	$25,000	1
23						19
24						

MedAttrib: author-generated. MS Excel Ch3-Format.xlsx final result.

You will find there is more than one way to do most tasks in Excel, and while the work-

through here may list one method, please explore.

Text size and styles

First, we'll work on **Row 1**, which is a document identifier title that lets a viewer know what the data they are seeing represents.

- Select cell **A1**. When active you will be able to see its contents showing in the formula bar.
- With cell A1 active, choose the Text size in the Home ribbon's Font group and select **18**. This makes the text a larger 18pt size.
- Then, from the same Font group, click the buttons for **Bold**, then **Italic**, then **Underline**.

Keyboard Shortcut: Text Formats. Hold down CTRL key while pressing the letter B (Bold), or I (Italic) or U (Underline) / Mac: hold down CMD key instead.

Cell and text colors

You can emphasize a region of a spreadsheet by adding color to the cells and/or text.

- Select the cells **A1-F1.** You may see the contents of only A1 in the formula bar, but you should also see a selection outline around the 6 cells you chose.
- Find the *paintbucket* <u>Fill</u> **Color** icon on the Home ribbon's Font group, and click the down arrow on its right side. This will show you a color palette to choose a cell color from.
- *If you hover over the colors, a tooltip will appear with the color's information.* Click on **Blue, Accent 5 Darker 25%,** which should be the second to the last column of colors, and second from the bottom of that column. OR, choose another **dark**

color you like from the palette.

· Click only cell **A1** again. Then using the **Font Color** button on the ribbon's Font group, click the down arrow on its right side. This will show you a color palette to choose a text color from. Select **White**.
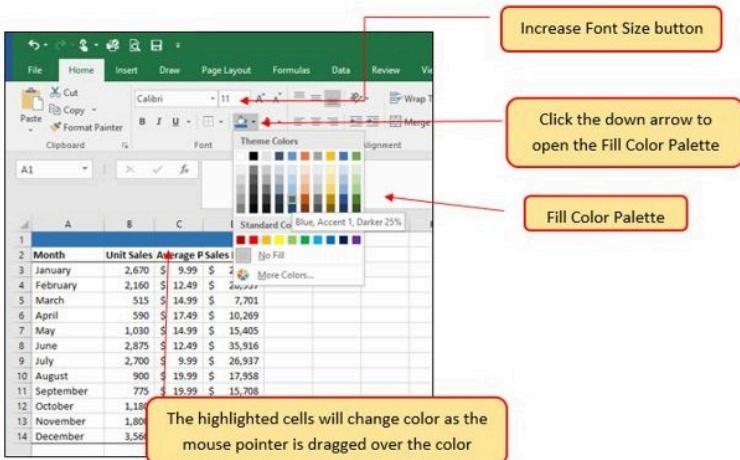

MedAttrib: Beginning to Intermediate Excel. MS Excel Fill Color Palette.

Merge Cells

Data is entered solely into one cell at a time, like in this activity file example's rows and columns.

However, for stylistic purposes, data can also be *merged* into more than one cell. For instance, the Merge & Center command is used to center the title of a worksheet directly above columns of data.

- Select cells **A1-F1** again.
- Click the arrow on the **Merge & Center** button in the Font section of the Home ribbon to select the Merge & Center setting.
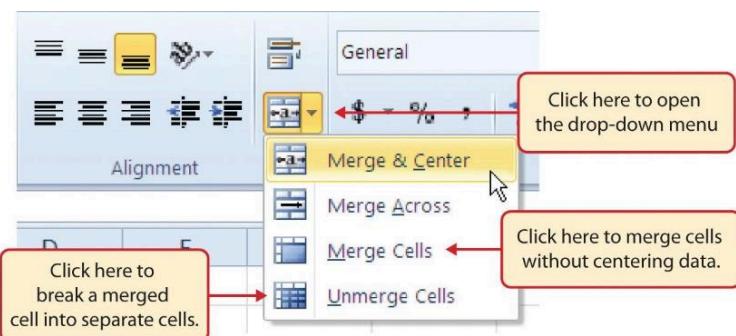
MedAttrib: Beginning to Intermediate Excel. MS Excel Merge Cell Drop-Down Menu.

- **SAVE your work as you go**: the Quick Access Toolbar shows a little disk icon, and the common keybind is CTRL S / Mac CMD S.

Dataset Formatting

Header rows

Any range of data in Excel that you may want to sort, filter, and/or calculate is considered to be a data set or data range. In order to help a viewer know what the data is for, a data range should include some kind of Header Row. This is a row that you use to identify the expected contents of the columns of data (with the names of the columns, like FirstName, LastName, etc,). Sometimes you may see instead a header column, *but for this course the norm will be the header row above columns*.

The header row should stand out from the rest of the range of data for ease of identification. Let's do that here.

- Select cells **A3-F3**.
- Using the Home tab's Font group Bold icon, make these cells **Bold**.
- With the A3-F3 cells still active, click the Font group Border button's arrow and

select **Bottom Border**.

- **SAVE your work** as you go: the Quick Access Toolbar shows a little disk icon, and the common keybind is CTRL S / Mac: CMD S.

Borders

In Excel, adding custom lines to a worksheet is known as adding borders. Borders are different from the *visually clarifying grid lines* that appear by default on a worksheet to define the perimeter of the cell locations. The Borders command lets you add a variety of line styles to a worksheet that can make reading the worksheet data much easier. Here is a method for adding preset borders and custom borders to a worksheet:

- Click the down arrow to the right of the **Borders** button in the Font group in the Home page ribbon. This displays border options. At the bottom, the **More Borders** will open a new Interface window called Format Cells, with one of the tabs in it

called border. *We won't use this right now, but it's good to take a look.*
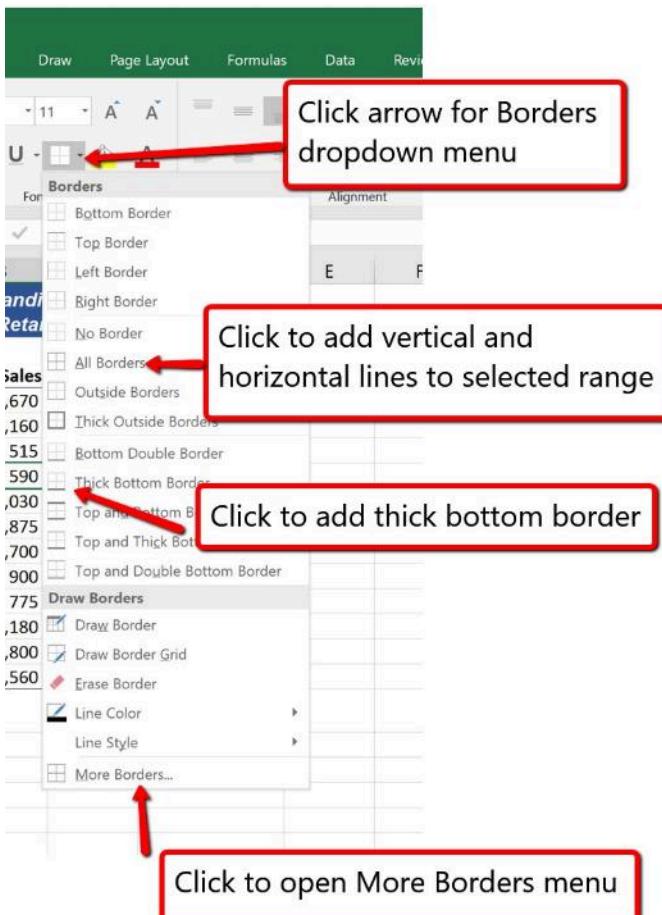
MedAttrib: Beginning to Intermediate Excel. MS Excel Borders Dropdown Menu.

Autowidth expansion

See how the column E for the salary data may be showing pound signs (####) in the data cells? This **####** indicates that a *numeric* data column is too narrow to accommodate the data in it. While a text column will show some of the data in a too-narrow column (like the Address column), Excel can't do this with numbers. Excel can't do wrap text for numeric data, because numeric formats are usually for calculations, not just static text information.

You can fix this issue by widening the column. We'll cover more column-related sizing later, but for now, the Autowidth action will suffice.

- Select the whole **Column E** – by clicking on the E column's letter E at its top. Your cursor tip should then also show a down arrow.
- Slowly move your cursor to the right until the tip shows a **Crosshair** graphic. This means you have hovered over the border *between* columns E and F.
- Double-click while you see this crosshair,

and **column E** should snap to a width that shows all the numbers within. You may have to try this a few times until you 'get the hang of it'.

Text Effects

Alignment of cell content

The data you input into cells, unless formatted into some numeric form, likely defaults to a Bottom Alignment and to an Align Left. Any workbooks you inherit may change these defaults, and/or you may develop a different preference for your own work. For this worksheet, we'll go for **Top Alignment** and **Align Left**. The file we are working with currently shows the first two columns are align center.

- Select cell **A3**, and click the **Top Align** button on the Home ribbon's Alignment group.
- With A3 still selected, then click the **Align**

Left button in the same Alignment group.
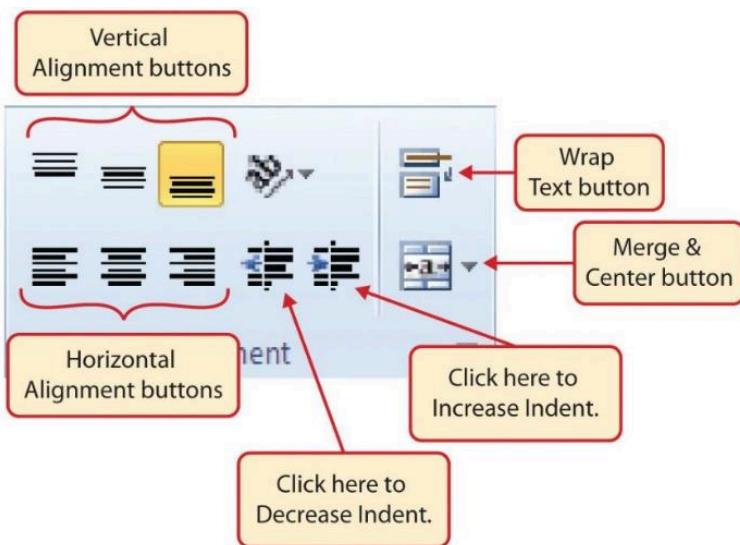
MedAttrib: Beginning to Intermediate Excel. MS Excel Alignment Group in Home Tab.

You can also change the alignments of *several* cells at one time:

- Select cells **A4-A21**.
- Click the Top Align and Align Left buttons again. The rest of the column should now look aligned like cell A3.
- Now, select cells **B4-F21**, and click the Top Align and Align Left buttons again. The rest of the table will also be formatted to

be top aligned and aligned left.

There is just one cell that may remain unaligned properly: cell **B3**. Let's use the **Excel Format Painter** button to fix that. The Format Painter button will pick up the formatting of a cell, and hold it until you click on another cell to 'copy' the format onto it.

- Select cell **A3**.
- Click once on the **Format Painter** 'paintbrush' button in the Home ribbon's Clipboard group.
- Then, click once on cell **B3**. This should copy cell A3's alignment format onto cell B3.
- **SAVE your work** as you go: the common keybind is CTRL S / Mac: CMD S.

Wrap text

Often, a text column may have not be wide enough for the information in it, and the text information will seem to be cut off. One way to fix this is to wrap text so that the cell will

increase in size to accommodate the data and also push some of the data in what seems like a second (or more) line in the **same cell**.

- Select cell **C4**.
- Click on the **Wrap Text** button in the Home ribbon's Font group. See how the row expands in height to show all the data which also now appears to be taking up a couple of "lines" of space inside the cell.
- Now, while cell C4 is still **active**, click on the Format Painter button from the Clipboard group.
- Then, while the Format Painter is active, hover then click over cells **C5-C21** to apply the wrap text to the rest of the column.

Keyboard Shortcut: Wrap Text. Press ALT key and then letters H and W one at a time. MAC: N/A

Number Formatting

Text is easy to work with in Excel – the program just recognizes it as static data that is

informational, not computational. However, numbers (unless used as dummy text in something like an address or phone number) are recognized as potential data to calculate. There are several types of numeric data that Excel recognizes, including:

- Comma, which adds a comma and a decimal point with a default 2 decimals after the decimal point.
- Dates, which offers both long and short US date formats.
- Time, which offers minutes and seconds.
- Percentage.
- Currency (discussed below).
- Accounting money (discussed below).
- Fraction.

For this example, let's first format the Salary columns contents with a comma so that the numbers look like common 'thousand' units.

- Select cell **E4**.
- Look for the Home ribbon's **Number** group, and click the arrow on its right side, which will show a dropdown selection of

number formats.

- Scroll down that list until you find **Currency**, and click on that. The cell's contents should now appear as $44,200.00.

- Let's take out the "cents" part of that number. With cell **E4** still active, click twice on the Number group's **Decrease Decimal**. This should remove the .00 from the number.

- You can repeat the Currency format and Decrease Decimal steps after you select cells **E5-E21**.

  - **Alternative method**: use the Format Painter paintbrush to paint cell **E4**'s format over cells E5-E21. Click once on the **Format Painter** 'paintbrush' button in the Home ribbon's Clipboard group while cell E4 is active, then paint over cells **E5-E21**.

- **SAVE your work** as you go: CTRL S / Mac CMD S.
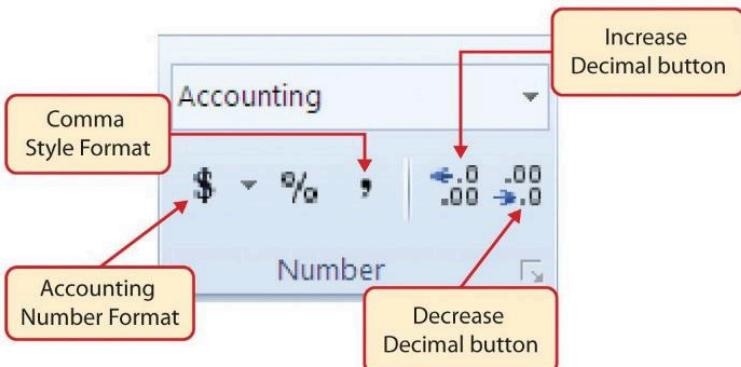
MedAttrib: Beginning to Intermediate Excel. MS Excel Number Group of Commands.

Formatting money standard practices

There are accepted professional formatting standards when spreadsheets contain only currency-related data. For this course, we will use the following Excel guidelines for formatting. The first image displays how to use Accounting number format when ALL figures are currency. Only the first row of data and the totals should be formatted with the Accounting format. The other data should be formatted with Comma style. There also needs

to be a Top Border above the numbers in the total row. If any of the numbers have cents, you need to format all of the data with two decimal places.

Excel Guidelines
For Correct Accounting Format & Chart Range

Sunny Escapes Travel Agency
Sales Report
For January 2013

	Week 1	Week 2	Week 3	Week 4	Total
Belize	$ 16,000.50	$ 14,530.00	$ 1,500.00	$ 16,050.85	$ 48,081.35
Costa Rica	4,500.22	1,350.00	3,500.20	6,599.00	15,949.42
Florida	9,500.00	10,500.75	14,080.35	7,065.99	41,147.09
Hawaii	20,000.99	6,010.00	15,000.00	17,865.00	58,875.99
Mexico	1,550.00	2,000.99	1,700.00	1,499.00	6,749.99
Total	$ 51,551.71	$ 34,391.74	$35,780.55	$49,079.84	$170,803.84

Use Accounting Number format ($) on top row and bottom total row only.

Use Comma Style format (,) for middle rows. Format with two decimals when dollar amounts contain cents. Make sure the decimals align.

Use a single border above the total row. Include a Grand Total where total row and total column intersect.

Destination Sales

Don't include totals when creating a chart. Chart range is B9:F14. Total row (row 15) and total column (column G) should not be included in chart range.

MedAttrib: Beginning to Intermediate Excel. MS Excel Accounting Standard format.

Often, an Excel spreadsheet will contain values that are both currency and non-currency in nature. When that is the case, you'll want to use the guidelines in the following figure:

Excel Guidelines
For Units and Dollar Amounts in the Same Worksheet

Sunny Escapes Travel Agency
Sales Report
For January 2013

Use a three line title if the workbook doesn't include a Documentation sheet. The three lines should include:
- Company Name
- Type of Report
- Date

	Week 1		Week 2		Week 3		Week 4	
	Number of Trips	Sales ($)	Number of Trips	Sales ($)	Number of Trips	Sales ($)	Number of Trips	Sales ($)
Belize	15	$ 16,001	12	$ 14,530	1	$ 1,500	15	$ 16,051
Costa Rica	3	$ 4,500	1	$ 1,350	2	$ 3,500	4	$ 6,599
Florida	4	$ 9,500	9	$ 10,501	12	$ 14,080	5	$ 7,066
Hawaii	19	$ 20,001	5	$ 6,010	15	$ 15,000	16	$ 17,865
Mexico	1	$ 1,550	2	$ 2,001	1	$ 1,700	1	$ 1,499
Total	42	$ 51,552	29	$ 34,392	31	$ 35,781	41	$ 49,080

When mixing columns of units with columns of dollars, format entire dollar column with Accounting Number format ($)

Format with no decimals when dollar amounts are whole dollars without cents

Remember to:
✓ Spellcheck your worksheet
✓ Print Preview before printing or submitting
✓ Use common sense when proofreading - do the results make sense?
✓ Make sure the worksheet looks professional

MedAttrib: Beginning to Intermediate Excel. MS Excel Currency/Mixed standard format.

The Format Cells panel

This was mentioned above. When you become proficient with Excel and the content you plan to produce, you can also use a more comprehensive Format Cells panel, which has several tabs you can choose from while formatting a cell or row or column.

Format Cells — Border tab

- Click here to apply the selected line style and color to all four sides of the highlighted cell range.
- Use this area to place a line in a specific location within the highlighted cell range.
- Click here to apply the thickest line style.

The selected border style can be applied by clicking the presets, preview diagram or the buttons above.
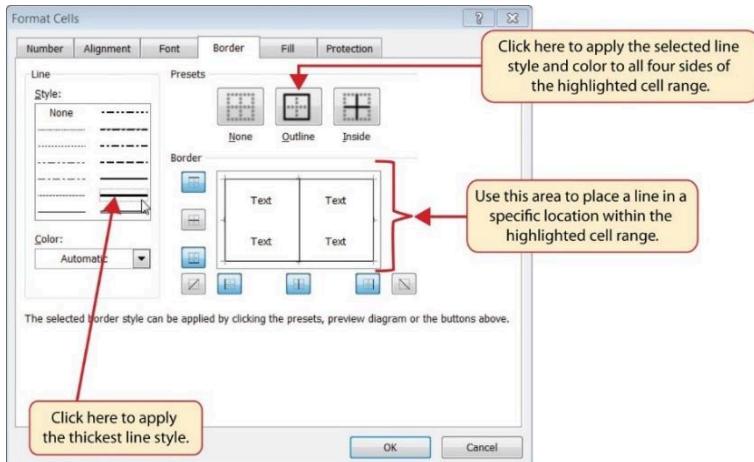
MedAttrib: Beginning to Intermediate Excel. MS Excel Borders Tab of Format Cells Dialog.

Here, we will add a line to the bottom of the data range we have been working on, so that you can input some data yourself, then format it. First, let's add another line of data – about YOU.

- Click on cell **A22**, and type **YOUR own first name** in it.
- Add more information **about yourself** in cells **B22-F22**. *Other than your own real last name, please feel comfortable 'making up' data for the other cells so that you preserve your confidentiality.*

- Once you have your new data entered in row 22, click on cell **A22**.
- Then, in the Font group on the Home ribbon, look for a tiny Font settings arrow icon in the Font group's lower right corner, and click on it. This should open the panel for **Cell Formatting**, which has 6 tabs in it: Number, Font, Alignment, Border, Fill, Protection.
- Since cell A22 is a static text data, you can use the **Font** and **Alignment** tabs to look at your choices and to change the cell's format.
- Using the **Alignment** tab, make the contents of cell **A22** top aligned and aligned left – if it is not already – then click **Okay**.
- Let's try an other way. **RIGHT-Click** on cell **B22**, then scroll down the contextual menu until you see the **Format Cells** option (*you may have to scroll down the menu list since it is near the bottom*). Then, click on the **Format Cells** option. The same Format Cells panel you have already used will open.
- Using the Alignment tab, make the

contents of cell **B22** top aligned, aligned left if it is not already, then click **OK**.

- ◦ Now, you can use either of these options to open the Cell Formatting panel as you adjust the formats of cells **C22-F22.**

- OR, you can just select cells of the row above your newly typed row – **C21-F21** – and click the Format Painter paintbrush button on the ribbon, and then paint the style over cells **C22-F22**.
- **SAVE your work** as you go: CTRL S / Mac: CMD S.

Special formatting

Much of your data formatting will be basic tasks, like changing the color of the text or cell backgrounds, cell/column/row alignments and wrap, and selecting basic numeric formats like dates, accounting, percentages, etc. However, there are a number of basic additional formats that Excel lets you customize in cell formatting for more complicated needs, like:

- Phone numbers
- Social Security numbers
- Zip codes
- Showing negative numbers in stand-out formatting
- Additional date and time formats
- Additional fraction formats
- Customized number formats
- Validation techniques (**later chapter**)

These options are shown in the **Format Cells panel,** in the **Number** tab.
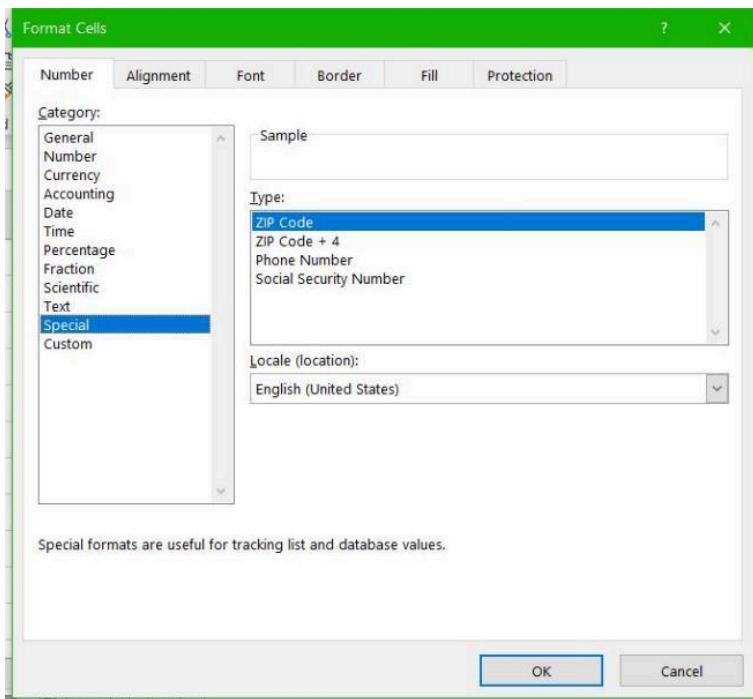
MedAttrib: autogenerated. MS Excel Format Cells panel.

Examples:

Phone number: 2065551234 = (206) 555-1234

Social Security Number: 2221111234 = 222-111-1234

Zip Code + 4: 981012345 = 98101-2345

Negative Number (one of the formats): -2700 = (2,700)

Sum Feature

Applying mathematical computations to a range of cells is accomplished through functions in Excel, which we will cover in detail in Part 4. However, the following steps will demonstrate how you can quickly sum the values in a column of data using the AutoSum command in the Home menu ribbon. It is now usually referred to as the **Sum** button but it automatically writes an addition formula for you.

- Click cell **E23** in the worksheet.
- In the Home tab's ribbon, look for the Editing group (more to the right side of the ribbon).
- Look for the button that looks like an and reads **Sum** when you hover over it. Click it while cell **E23** is active.
- What you'll 'see' in the Formula Bar: cell **E23** will turn into a formula –

=SUM(E4:E22) – and a dotted border and light blue fill will affect the column of numbers above it. *This is Excel's way of writing a basic addition calculation for you.*

- When you press the ENTER key on your keyboard, the sum will calculate automatically, and add up the numbers in the column above cell **E23**.
- Now you will see the sum of the salaries of the people in the data range we have been working with, *including* the row you input about YOU!
- You should select the cell **E23** again, and apply the **Accounting** format to it.
- **SAVE your work** as you go: CTRL S / Mac: CMD S.

We are finished with this activity!

Chapter 4: Data - Conditional Formatting

- Duplicate Values
- Text That Contains. . .
- Ranking Rules
- Range Conditions
- Color Scales
- Data Bars
- Icon Sets
- Corrections

Conditional Formatting in Excel allows you to visually identify patterns in data so that it is easier to analyze for patterns and trends. You can apply conditional formatting to a range of cells (either a selection or a named range), an Excel table, and in a Pivot table report (in Windows, not Mac).

*NOTE: This chapter is presuming that learners are using the default Office color palette that Excel opens with. If you are using another one, you will need to go into the Page Layout ribbon, choose the Colors icon of the Theme group, and select **Office***.

The important thing with any conditional formatting is for it to be useful for observing and analyzing data. It should not get in the way of the data, or be used in ways that is a barrier to anyone with visual divergences who cannot see the formatting. Keep your conditional formatting very readable with good contrast colors and border line thicknesses, wider columns if needed, and use of conditions that don't rely solely upon color differentiation to be useful.

ACTION: Try Me activity

This is what we will achieve in this chapter (image below). Please refer to it as you try the following activities. The instructions are for Windows PC and Mac users may have different UI locations for some of the commands. To

work along, please download the starter file **Ch4-Conditional.xlsx**, open it, and save a copy of it to work on. This file is for Taste du Monde, an international specialty foods company, and we'll look at a basic workbook for them. You'll see them again later in the course!

MedAttrib: author-generated. MS Excel Ch4-Conditional.xlsx final result.

Duplicate Values

First, let's look at Duplicate values. Duplicate values are something you may need to see to determine if there is a pattern or an error in

inputting data. Conditional formatting can help you "see" these things.

- Select Cell**s A6-A33** in the **OrderNo column**.
- On the **Home** Menu ribbon, look in the Styles group for the **Conditional Formatting** button.
- Press the button's down arrow to see the choices available.
- Choose Highlight Cells Rules, then choose Duplicate Values.
- Click OK in the dialog box that appears. This will add formatting to cells that seem to be duplicates of other cells in the same column.
- Scroll down your Excel worksheet to see a couple of highlighted duplicates.
- This is a good use of Duplicate Values, because here you can see if the OrderNumber refers to the same order or possibly an input mistake. **Hint**: *In THIS case, the duplicates are an error, since they refer to two different order dates*.
- **SAVE your work as you go**: the Quick Access Toolbar shows a little disk icon, and

the common keybind is CTRL S / Mac: CMD S.
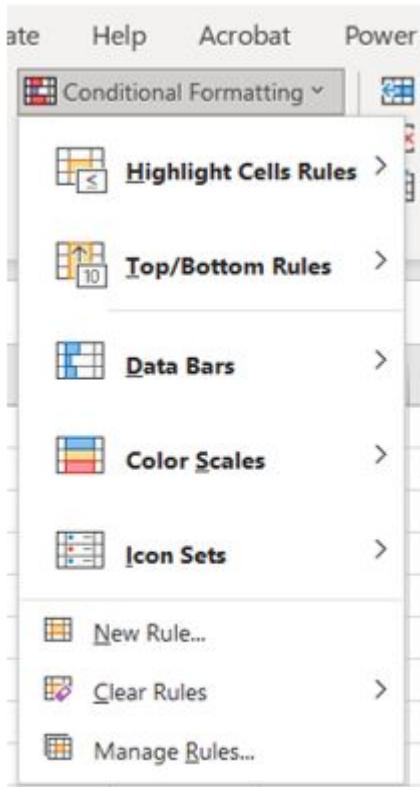
MedAttrib: author-generated. MS Excel Conditional formatting dropdown.

Try Another:

Select Cells E6-E33 in the **Sub-Category column**.

- Again choose the Conditional Formatting button
- Again Choose Highlight Cells Rules, then choose Duplicate Values.
- Again click the OK button.
- Now scroll down your worksheet, and see how ALL of the data cells in column E are highlighted.
- **Note**: *This is <u>not</u> a good use of conditional formatting,* especially if you are actually trying to 'sort' or 'filter' or otherwise work on specific data of like content/kinds. You would use Sorting or Filtering – to be discussed in a later chapter.

Text That Includes...

You may need to look for data that includes something specific, especially if you are working in a large worksheet and the data is buried in the content of a cell with additional information. *This is a **TEXT**-Only task,* not for numeric data.

- Select **Cell D6** in the **Category column**.

- Choose the Conditional Formatting button, then choose **Highlight Cell Rules.**
- Choose **Text that Contains...**
- In the dialog box that opens, type the word Cook, then select the **Red Border** from the dropdown style options, then click OK
- Look at your worksheet. Cell D6 should have a red border around it.
- Next, let's use this conditional formatting on the rest of the column.
- While in **Cell D6**, Click the Format Painter **paintbrush** in the Home Menu ribbon's Clipboard group.
- Paint the rest of the column: cells D7-D33. This will apply the conditional formatting rule to all these cells, although *only* the 'Cookery' cells will be highlighted because only they will match the criteria.
- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Ranking Rules

Top/Bottom formatting lets you get a feel of the importance of some percentage of numeric

data. Perhaps you want to know the top 5% of the scores on a class test, or the 10% of students who seem to have the lowest scores and might need additional assistance. Here we'll consider the prices for products at Taste du Monde.

- Select **Cells G6-G33** in the **Price column**.
- Choose the Conditional Formatting button, then choose **Top/Bottom Rules.**
- Click Top 10%.
- In the Top 10% dialog box that opens, you can see that 10 is already selected in the Percent field – *this number can easily be changed as one needs in future work*. Keep **this** at **10**.
- In the styles field, choose **Custom Format**.
- In the Format Cells panel, choose the **Fill tab**.
- In the Fill tab, choose a **pale yellow background color**. This should be in the 8th column of the color palette, lightest yellow option. Click on it, then click OK.
- In the Top 10% dialog box, click OK.
- As you scroll down your worksheet, you should see two cells with the pale yellow highlight color.

- **SAVE your work** as you go: Keybind is CTRL S / Mac CMD S.

Average Conditions

Another option of Top/Bottom rules lets you see averages in some numeric data, such as to see if some products are underselling. Here we'll consider the order prices at Taste du Monde.

- Select **Cells I6-I33** (*Column I* – Cell I6 through Cell I33) in the **OrderPrice column**.
- Choose the Conditional Formatting button, then choose **Top/Bottom Rules.**
- Click Below Average
- In the Below Average dialog box that opens, you have only a formatting selection, including Custom. In the styles field, choose **Custom Format**. This will open a Format Cells panel.
- In the Format Cells panel, choose the **Fill tab**.
- In the Fill tab, choose a **pale blue**

background color. This should be in the 5th column of the color palette, lightest blue option. Click on it, then click OK.

- In the Below Average dialog box, click OK.
- As you scroll down your worksheet, you should see several cells with the pale blue highlight color.
- **SAVE your work.**

Range Conditions

Another option in Top/Bottom formatting lets you observe a specific and limited range of numeric information in a column. Here we'll consider the prices for sales tax at Taste du Monde.

- Select Cells N6-N33 in the **Tax column**.
- Choose the Conditional Formatting button, then choose **Highlight Cells Rules.**
- Click **Between**.
- In the Between dialog box that opens, you can input values for the lower and upper range of what you want to consider – *this number can easily be changed as one*

needs in future work. Type **.75** in the first field and **1.25** in the second field.

· In the styles field, choose **Light green fill with dark green text,** then click OK.
· As you scroll down your worksheet, you should see several cells that qualify have changed color.
· **SAVE your work**.

Color Scales

Conditional Formatting Gradients lets you see a sort of 'heat map' of the range of all the numeric data in a cell. Here we'll consider the with discount totals at Taste du Monde to see how they range in value.

· Select **Cells L6-L33** in the **WithDiscount column**.
· Choose the Conditional Formatting button, then choose **Color Scales**.
· Click the **Green-White** color scale. This will instantly apply the conditional formatting.
· As you scroll down your worksheet, you should see a variation of greens to white in

all the cells of the column. Note that we
selected the 2-color green-white, instead
of the full color range; this was simply
because this particular activity worksheet
is already stuffed full of eye candy.
- **SAVE your work**.

Data Bars

Instead of colorizing an entire cell, one might
use small data bars to observe the difference
in numeric data values. Here we'll consider the
with order totals at Taste du Monde to see how
they range in value.

- Select **Cells O6-O33** in the **OrderTotal
  column**.
- Choose the **Conditional Formatting**
  button, then choose **Data Bars**.
- Click the **Blue Gradient Bars** color scale.
  This will instantly apply the conditional
  formatting.
- As you scroll down your worksheet, you
  should see a bar of some length in each
  cell of Column O. This can look better and

make more sense if your choose to make the column wider than just the content, especially if the bar seems to overlap any of the text. Remember, the important thing with any conditional formatting is for it to be useful, which means readable with good contrast.

· **SAVE your work**.

Icon Sets

One difficulty with Conditional Formatting is that much of it relies on color. There are, however, a lot of people who have some form of color perception divergence, and unless the conditional format color only uses high-contrast, and only 1 color selection to differentiate conditions, a color-divergent person may not be able to access and interpret the data. It can get in the way of actually seeing the data itself, too.

Excel doesn't give many options, but the **Icon sets** can help. Many still depend on colors, but a couple give primarily 'shape-oriented' options,

like the arrows used in our finished example above, and a couple more indicators' choices. Even though these indicators use colors, the shapes themselves can be differentiated without color.

Here we'll consider the Discount prices at Taste du Monde to see which are the higher discounts of 10%, medium of 5%, and no-discount price.

- Select Cells K6-K33 in the **DiscountPrice column**.
- Choose the **Conditional Formatting** button, then choose **Icon Sets**.
- In the Icon Sets samples, click the first of the Directionals – the 3 directions of arrows that are red, yellow, and green.
- As you scroll down your worksheet, you should see all the K Column's data cells show an arrow that you could identify even if you cannot see color.
- **SAVE your work**.

Corrections

What if you have made a mistake with your Conditional Formatting? Or, do you want to delete it altogether? This is very easy to do. You can use the Conditional Formatting **Manage Rules** option.

- On the Home Tab, in the Styles Group, select **Manage Rules** at the very bottom of the Conditional Formatting drop-down list.
- Show formatting rules for: **This Worksheet**
- In the Conditional Rules Formatting Manager panel that opens, click once on the Duplicate Values for cells E6-E33.
- Click on **Edit Rule**, then click the format button.
- In the **Format Cells** panel, choose the Fill tab.
- In the Fill tab, choose a pale orange background color. This should be in the 6th column of the color palette, lightest orange option. Click on it, then click OK.
- Click OK to exit the Format Cells panel, and click OK to exit the **Conditional Rules Formatting Manager** panel.

- **SAVE your work** and close your file. We're finished!

TIP: Conditional Rules Formatting Manager. You can also choose to delete a formatting rule, duplicate one to change the data range and modify the style for it, and even to create a new rule that you could then apply to a data range you select.
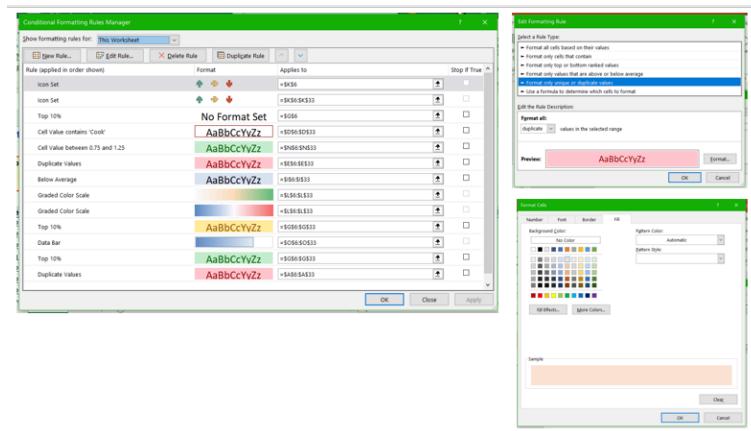
MedAttrib: author-generated. MS Excel Conditional formatting manager.

Chapter 5: Inserts and Visual Appeal

- Themes
- Modifying Themes
- Tables
- WordArt
- Pictures
- Icons
- SmartArt
- Hyperlinks

Excel is primarily a spreadsheet for computations and data analysis. However, it also has a number of basic visual communication enhancements, like Microsoft® Word® and Microsoft® PowerPoint®. This is mainly so that documents shared by the same entity, like a business or

a multi-application project can use the same stylistic elements between them. In this chapter, we will work with a small file and play around with adding elements to it.

ACTION: Try Me activity

For this chapter, we will use the data file **Ch5-Inserts.xlsx** in order to demonstrate the various steps. Please find and open **Ch5-Inserts.xlsx**, and save a copy to your Examples folder. Most of our work will use **the Inserts menu ribbon**, with some coverage of the **Page Layout menu ribbon** for *only* themes, colors, fonts, and effects.

MedAttrib: author-generated. MS Excel Ch5-Inserts.xlsx final result. Dessert: Creative Commons

Themes

We'll start with the Page Layout ribbon. This is because when putting together a document or spreadsheet, it can be more efficient to look from the macro level to the granular level; the theme, colors, and other things that affect all the styling of the worksheet should be considered when creating the project, so that any inserts, tables, and charts/graphs flow from the color and font selections.

In **Ch5-Inserts.xlsx**, we'll change the theme first, then determine if it meets our needs and how to adjust it by choosing other colors and/ or fonts. Normally, Excel defaults to the current Office theme, which gives a palette of colors and shades from across the color spectrum. However, on spreadsheets, you may instead prefer a different color set, or inherit a workbook at work that uses another color

scheme, or be tasked with an assignment with certain theme specifications. While Excel is designed for themes to be changed almost effortlessly and without technical glitching, it is always good to plan your work and do steps efficiently to avoid rework or conflicts to very large spreadsheets later.

Colors to prioritize for this small company: royal blue, muted brick red, white, French blue, yellow ochre, pale lavender. We'll find out what applies in the color themes, if any. Blues and related muted colors are preferred. We may not find them all in a theme, but a theme that captures several will work.

Note that the file you open already has a deep blueish color applied to the data range's header row, which will be important to remember later. The text in the row seems invisible as a result.

- Click on cell A1, then choose the **Page Layout menu ribbon**.
- In the **Themes** group of the ribbon, choose the **Themes dropdown** box arrow.
- For fun, just click on a few – on your screen

outside the Themes dropdown, you can see the fonts and the header row color seems to Preview a change.

- We'll settle on the **Berlin theme**, because the font selection seems easy enough to read with a little added text boldness, but not too stylistic to make a workbook hard to understand.
- The existing color of the header row will have changed color.
- **SAVE your work** as you go: Keybind is CTRL S / Mac CMD S.

Note: this course is focusing on Excel for Windows (PC) and the assumption that your full installation has all the built-in items, like themes, color palettes, etc. However. If you don't have some of these themes or named palettes / font collections (like with a Mac), choose what you can that seems closest to gain the skills-building anyway.

Modifying Themes

Now, the Berlin theme has great fonts, but the

color palette may not work. Let's check it out. The Taste du Monde header row is currently kind of a orange-brown color. Not good for the company's planned color scheme.

- Right-click on the Cell A5, the first cell in the header row, which will pull up a menu list.
- Choose the **Format Cells** (*you may have to scroll down the menu list since it is near the bottom*), which opens the Format Cells panel. In this panel, choose the **Fill tab**.
- In the Fill tab, look at the upper left that shows a palette of 10 columns of colors and their shades. This is the color palette for this particular theme, and includes maybe a couple of the muted French county colors we could use, but no blues. No thank you!
- Exit the Format Cells panel by clicking **Cancel**.
- **SAVE your work** as you go: Keybind is CTRL S / Mac CMD S.

Colors Palette

Now, let's consider other color options for this theme. While keeping the Berlin theme, we will use the Colors panel to look at options.

- You can click anywhere on the work area of your worksheet; then In the **Themes** group of the ribbon, choose the **Colors dropdown** box arrow.
- We are looking for something that has a dark blue, medium blue, darkish brick red, and a couple of neutral colors in the palette that could be purposed for Taste du Monde. Scroll down the Colors dropdown, and notice how our header row's color changes. The closest we may find is the **Aspect** color palette.
- In the Colors palette, choose **Aspect** (near or at the bottom of the list). This looks mostly like reds and so we'll repeat looking at cell A5 in the Cell Format panel's Fill Tab to check out the color palette's spread of colors.
- In the Cell Format panel's Fill Tab, look at the color palette. In it, there is a blue

column with a dark blue and a French blue, dark brick reddish color, a lavender color, a kind of light tan, and white. This should do.

Fonts Palette

We can look at the Fonts palette to determine if we want a different font set.

- You can click anywhere on the work area of your worksheet; then In the **Themes** group of the ribbon, choose the **Fonts dropdown** box arrow.
- In the dropdown list, there are a number of font sets. Unfortunately, the dropdown list does not show which specific font set we are using. You need to click on one of the cells in your workspace to see, in the Home ribbon's **Font Field** which font this document is using: Trebuchet.
- Scroll down and see how the fonts on your worksheet seem affected in the preview. *You can choose to experiment* by clicking on one or two, but for Taste du Monde,

we'll stay with the Berlin theme's chosen
fonts.
- **SAVE your work** as you go: Keybind is
CTRL S / Mac CMD S.

Effects Panel

The Effects panel lets you preview some effects
that can be used on graphics like shapes,
SmartArt, WordArt, and image borders in Excel
workbooks. We don't have a shape inserted yet,
but we can change this effect in advance. We
may see how this is reflected in a later inserted
item.

- In the **Themes** group of the ribbon, choose
  the **Effects dropdown** box arrow.
- Click on the **Glossy** effect to choose it.
- **Note**: Effects can be very subtle,
  depending on the theme used. Some
  themes will show more effects, and others,
  like Berlin, may not show much effect
  detail at all.

Tables

Tables are an Excel mainstay of 'collecting' data in an integrated format. They allow the data rows and columns to be seamlessly connected to each other for efficient sorting, filtering, styling, and calculations. We will cover tables in detail in Part 2. *However*, for this activity, we want to convert the data range of cells **A5 through D28** from a plain data range to an Excel Table object, because this is something that can be better modified with the Theme and Color Palette's options.

Now, we will cover **the Inserts menu ribbon** options. For the purpose of this chapter in Inserts, we will simply 'insert' a table for the practice, since it is a very important skill. Inserting a table over a range of data (bunch of cells) actually converts the existing cells to the table object, it doesn't put in a new separate table,

- Click on cell **A5**.
- Go to the **Inserts menu ribbon**, to the **Tables** group.

- Click on the **Table** button.
- When a small Create Table dialog box opens, put a checkmark in the *My table has headers field.*
- Look over the field for "Where is the data for your table." Excel has improved significantly over its versions, so that the program can discern a collection of data in a range of cells next to each other (columns, rows). As a result, the field for *Where is the data...* should already be populated with the information **$A$5:$D$28,** which is the spread of cells from the first cell in the Header row to the final cell at the lower left of the range of data.
- If, for some reason, you do not see this info in the data range field, you can manually type it in: **$A$5:$D$28**
- Click the OK button on the Create Table dialog box. The range of data from A5-D28 will have converted the plain data range into a default table format with filters and banded color rows that uses the Berlin theme's fonts and the color palette we chose.

- **One more thing**: we will want the table's header row text to be white, so you need to select the header row cells and change the font color to white so you can see the text in the colored background.
- For now, *we will do **no** more work with this table*. Lots more on tables will be in Part 2!
- **SAVE your work.**

WordArt

WordArt lets you add a special stylized and editable text graphic. In Excel, graphics like WordArt, SmartArt, images, and shapes are all 'unanchored' to cells, which means that they float above cells and can be easily moved without affecting the data inside your cells. We won't cover the other Text Group button options in this activity, but they work much the same way as the WordArt one.

Here is a refresher of what the final project should look like.

- Delete the content in cell **A1**.

- In the **Inserts menu ribbon,** click the Text group button for Text, and select **WordArt** from the dropdown menu.

- In WordArt, click the last option on the second row: **Fill: Dark blue Accent Color 3; Sharp Bevel**

- A WordArt box will appear on your workspace. It is in a poor position and the text seems really big. The good news is that this is editable.

- First, click inside the WordArt. This 'activates' the WordArt, and a new, contextual ribbon appears at the right-hand side of your Menu bar, called **Shape Format**.

This same kind of contextual ribbon options shows up for anything you can insert in Excel. *For now, we **won't** work with this one*. Instead:

- Type over the words in the WordArt to replace them with **Taste du Monde**.
- Next, select all those words, and using your Home ribbon's font size field, choose the **font size 24**.
- Then, click outside the WordArt box, carefully hover your mouse cursor over it until you get a dark crosshairs icon, and press down to select the WordArt box for movement.
- Move it by dragging the box over to the right border of cell **B1**.
- **SAVE your work**.

Pictures

Excel lets you add illustrations, like photos and clipart. Like WordArt, pictures are 'unanchored' to cells, which means that they float above cells and can be easily moved without affecting the data inside your cells. Also, like WordArt, an

inserted picture (when made active by clicking on it) will reveal a contextual Menu ribbon for doing editing work on the inserted item.

- In the **Inserts menu ribbon,** click the **Illustrations** group button for Pictures.
- Click **Pictures**, which shows you image locations to choose from: This Device, or Stock Images, or Online Pictures.
- In this case, assuming you are online, choose the **Online Pictures** option, which will pull open an Online Pictures window only.
- If you see the option in this window, **place a checkmark** in the **Creative Commons Only** checkbox, so that you use only freely available images.
- Then, type in YOUR favorite type of dessert – if you have one – and look at the results you get. Then, choose one of the images and click it, which will insert it into your worksheet.

Your image could insert itself in any size, so we'll set a size for whatever image we use so

that it works nicely in the Taste du Monde worksheet.

- Click your inserted picture. This 'activates' the picture so that a new, contextual ribbon appears at the right-hand side of your Menu/Ribbon bar, called **Picture Format**. *We will use this ribbon for the next several steps.*
- In the **Picture Format ribbon**, on the far right, choose the text field for the **horizontal** size, and type in 1.5." This will resize your picture to 1.5 inches wide, and to whatever the proportional height is.
- Next, click the **Accessibility button** on the **Accessibility** group. In the text field, type "image of my favorite dessert," and place a checkmark in the **Mark as decorative** checkbox. This allows Excel to consider this image as accessible in the program.
- Then, in the Picture Styles group, choose **Picture Border**, and in the dropdown, choose the color black. This adds a very narrow border to your picture.
- in the Picture Styles group, choose **Picture Border** again, and in the dropdown,

choose Weight, and on the flyout menu, choose **3pt**. This will make a more prominent border for your picture.

- Drag the picture so that it floats just to the top right edge of the Taste du Monde table, like in the final example above.
- **SAVE your work**.

The Picture Format menu ribbon offers all sorts of options for you to work with:

- Adjustments like color correction, colorizing, and artistic effects;
- Picture Styles like preset borders and Picture borders / effects / layout;
- Arrange options like Bringing Forward and Sending Back; and
- Size options like Crop and resizing fields.
- *Just for fun, you could try using an artistic effect on the image*.
- **Note**: Even though we selected "frosted" in the Effects Panel selection above, this effect may not actually appear prominently on an image – it will usually appear for inserting shapes and such. No worries!

Icons

Excel also lets you add other illustrations, like icons. Icons are built into the Excel subscription and Excel accesses them online. Icons also are 'unanchored' to cells, and an inserted active icon will reveal a contextual Menu ribbon for doing editing work on the inserted item.

- In the **Inserts ribbon,** click the **Illustrations** group button for Icons.
- Excel will open a **Stock Images** online search panel in the Microsoft® library for Excel/Office subscribers. This search area has tabs for Images, Icons, Cutout People, Stickers, Illustrations, and Cartoons that are in the Microsoft® library.
- In the **Icon tab** of the Stock Images search, type **food**, then scroll down until you see a little **black croissant**. You could also type "**croissant**" in the search bar.
- Click the selector circle at the top right of the croissant icon, then click the Insert button at the bottom right of the Stock Images search panel.
- The icon will appear in your Excel

workspace, floating somewhere in the center. Clicking on it will activate a **Graphics Format** contextual menu ribbon.

· You can manually resize the icon by dragging the lower right-hand corner inwards to make it a little smaller, say .7 inches. Or you can click on the icon and type **.7"** in the Graphics Format ribbon.

· Then, drag the croissant icon over to the left side of **Cell A1**, like in our example final image above.

· After that, click on and drag the WordArt of Taste du Monde a little to the left so that it aligns with the croissant icon, like in our example final image above.

· **SAVE your work.**

SmartArt

SmartArt is a Microsoft illustration that combines editable linked shapes with text boxes, and allows you to an alternate way of structuring visual communication information. SmartArt is 'unanchored' to cells, and an inserted active SmartArt item will reveal a

contextual Menu ribbon for doing editing work on the inserted item.

- In the **Inserts ribbon,** click the **Illustrations** group button and look for the **SmartArt** button.
- Excel will open a **SmartArt** panel that offers many SmartArt choices in several group options.
- From the top group option – All – scroll down and choose the Continuous Arrow Process, then click OK.
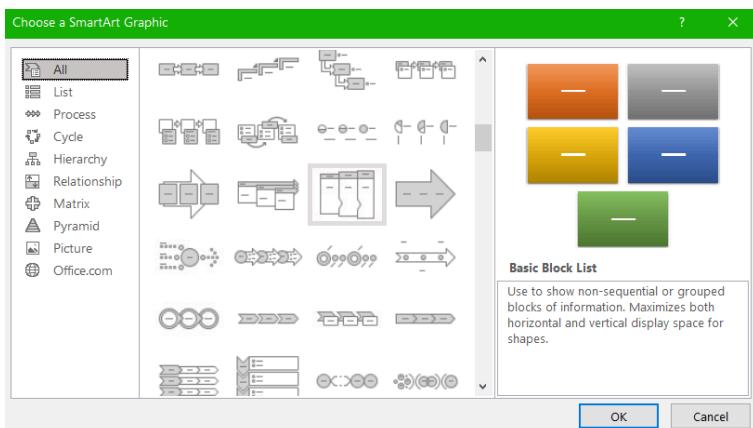
MedAttrib: author-generated. MS Excel SmartArt panel.

- The SmartArt will appear in your Excel

workspace, floating somewhere in the center. Clicking on it will activate a **SmartArt Design** contextual menu ribbon and another contextual ribbon to its left simply called **Format**.

- In the **SmartArt Design ribbon**, let's change the color using the SmartArt Styles group. Choose **Accent 3**, which is the dark blue.
- Inside the SmartArt, click the first Text field and type **Quality**. Click in the second Text field and type **Care**. Click in the second Text field and type **Desserts**.
- Inside the SmartArt, click on the **Format contextual ribbon**. In the ribbon's **WordArt styles**, click on the **Text Fill** button. In the **Text Fill palette**, choose White.
- Do these same steps to change the words *Quality* and *Desserts* to white.
- Click on the border of the SmartArt image, and in the Format ribbon's right side, choose Size. In Size / Width, type 4".
- Carefully drag the whole SmartArt graphic so that it flies out about ½ inch from the right side of your image of a dessert.
- **SAVE your work.**

SmartArt has a lot of options to work with, especially in changing colors, effects, adding text and levels, and more. There are also several types of SmartArt groups:

- *List*: Non-sequential information
- *Process*: Steps in a process/timeline
- *Cycle*: Illustrate a continual process
- *Hierarchy*: Organization chart or decision tree
- *Relationship*: Show connections
- *Matrix*: Demonstrate how parts relate to the whole.
- *Pictures*: use to accent content.
- *Pyramid*: Illustrate proportional relationships.

In SmartArt, you can add and organize text in hierarchical levels either manually or with a text pane. There is too much to cover when our focus is on Excel, so it is recommended that you experiment on your own for this.

Hyperlinks

You may need to add hyperlinks in Excel worksheets, especially if you create/maintain lists of customers with email addresses, and companies with website locations.

- Select Cell **A3**, which reads Visit Our Website!
- In the **Inserts ribbon,** click the **Hyperlink** button (near the middle right). There may be a list of recent documents you have used, but ignore those for now; click **Insert Link** which is listed at the bottom of the dropdown.

Insert Link will open an **Insert Hyperlink panel**, which offers the options to link to: an existing file or web page, a place in the same workbook, a new creation of another document, or an email address.

MedAttrib: author-generated. MS Excel Insert hyperlinks.

- Choose the **Existing File or Web Page** option.
- Then, in the **Address field** at the bottom of the panel, type: **http://www.tastedumonde.biz** (Note: this is a made-up address for this task; to my knowledge no such business actually exists).
- **SAVE your work**, then close your file. We're done with it!

Keyboard Shortcut: Add Hyperlink. Hold down CTRL key while pressing letter K on your keyboard / Mac CMD K.

Chapter 6: Distribution

- Print Preview
- Page Layout
- Repeating Column/Low labels
- Page Breaks
- Print Area
- Headers and Footers
- Spell Checker
- Cleanup with Find & Replace
- Accessibility Review
- Notes and Comments
- Protecting Workbooks and Worksheets
- Backstage Info Page
- Distribution Methods

Excel workbooks can be distributed in several ways, such as a printed document, a PDF for printing or adding to a website, shared in the cloud through OneDrive, linked into a

SharePoint site, and exported to PowerBI (a business enterprise application). Whatever method you might need to use to share your workbooks, setting them up for readability, printability, and clear defining between pages and sections is important. For our purposes, we'll focus on practical standards for printing, which also translate well to PDFs and to being linked into a SharePoint (because other people might print or view your workbook(s) in a meeting, etc.)

ACTION: Try Me activity

Please find and open **CH6–Distribute.xlsx**, and save a copy to your Examples folder. Some of our work will use the **Page Layout menu ribbon**, with some coverage of the **Review menu ribbon**, and some coverage of the Home menu's Backstage area for Info, Print, Share, Export, and Publish.

Print Preview

Print previewing may seem to be an odd place to start a chapter on distributing Excel workbooks, since there are a lot of pre-distribution tasks one needs to get done first. However, Print previewing is also the quickest way to see how a document will look when you print it, so we'll start here.

With **CH6–Distribute.xlsx** open, go to your File menu item on the menu bar. When you click File, you will enter the Excel Backstage area (*covered in Chapter 1*). Much of the Backstage area has to do with printing and other document distribution options.

- In the Backstage area, click Print.
- Look at how the CH6-Distribute.xlsx will look if we just printed it as is. Below the image of the page printout, there is a field that reads Page 1 of 6. The data would be there, but it would be messy, with confusion as to which page is which.

Keyboard Shortcut: Print (and Print

preview). CTRL key P / Mac CMD P.

In this view, the left hand side of the Print preview page tells us what the page size, orientation, margins, page scaling for print, and which sheets will be printed. The information shown in the Print preview page is the default for Excel, and you'll need to make changes.

The Print preview page can be used for making changes to your document if you need to do so just before printing. For instance, a common adjustment is to choose to print the full workbook (all worksheet tabs, not just the current one you were on before going to the Print preview). Another common adjustment is the scaling of the page on the printout. The Collated/Uncollated option has to do with how a printer (particularly an office printer with many options) will output your documents.

However, while you can use the Print Preview page to change margins, page orientation, and page size, this is a messy use of your time. Planning those things should happen as you begin a new document, the same as the

Theme (Chapter 6) and other page layout options (see below).

TIP: No printer? Many people do not have a printer accessible where they work (home, in a classroom, in a coffeeshop or at a friend's home, etc. In this case, some of your prep work may not work if Excel doesn't recognize a printer to address options to. <u>Easy fix</u>: Set your printer to "Microsoft Print to PDF", which acts as a virtual printer structure.

Instead, we'll focus on the Page Layout menu ribbon for common workbook and worksheet setup.
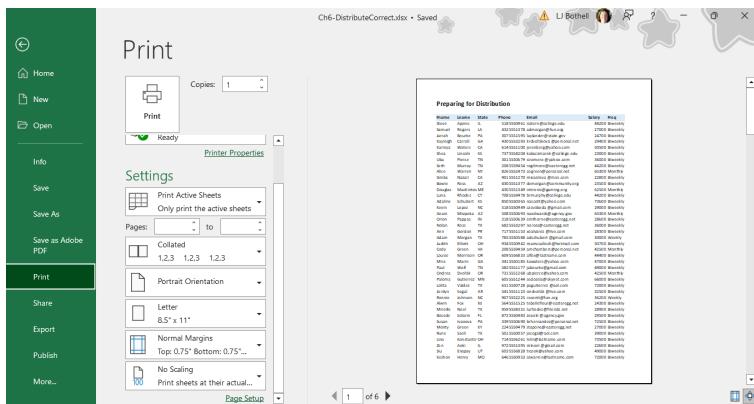
MedAttrib: author-generated. MS Excel Print preview.

Page Layout

For any document you work on – Word, PowerPoint, and Excel – you need to plan your output even as you are creating a new document. You will likely inherit a lot of workbooks in the workplace and need to contend with what you receive, and even then it is a good practice to understand a document's shape and size before getting into the actual content.

The Excel Page Layout menu ribbon offers most tasks you need to accomplish to set your documents up appropriately to your needs. What you do here will stick with your document and once in the Print preview before printing/distributing your work, the prepared output should be assured. *Note that your changes will affect only one sheet of your workbook unless you temporarily group them.*

TIP: Multiple Worksheet set-up: You can select all the worksheets in your workbook and set the Page Layout options all at once, if you know what your project parameters will be.

- With your CH6-Distribute.xlsx file open, select both the Distribution sheet and Sheet2 by clicking on the Distribution sheet worksheet tab, holding the SHIFT key down, and then clicking on the Sheet2 worksheet tab.
- Go to the **Page Layout** ribbon's Page Setup group, and click **Margins**.
- With Margins open, choose **Narrow**. Then, click Margins again, and choose **Custom Margins** (at the bottom).
- Custom Margins will open the Page Setup panel, and the Margins tab in it. Make the changes to the margins that you see in the image below:
- Top margin=1,   Bottom margin=.70,   Header=.25,   Footer=.25,   Center on page=Horizontally
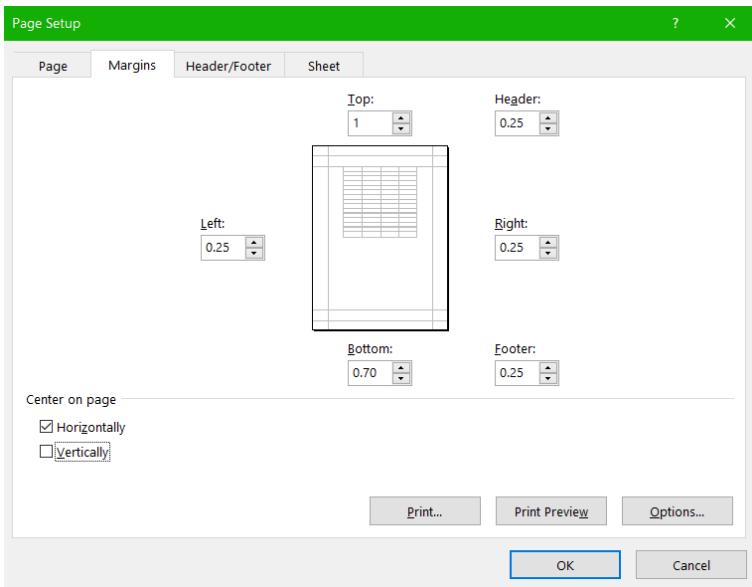
MedAttrib: author-generated. MS Excel Page setup.

- Click OK to exit the Page Setup panel.
- Next, with both the Distribution sheet and Sheet2 still selected together, choose **Orientation** from the Page Layout ribbon's Page Setup group.
- Choose **Landscape**. The default is Portrait, which makes the worksheet print-out taller than it is wide. Landscape will make it wider than tall, and help accommodate more columns of information on the same page.

- With both the Distribution sheet and Sheet2 still selected together, choose **Size** from the Page Layout ribbon's Page Setup group.
- In the Size dropdown, choose **Legal**. Legal (8.5" x 14") is often used for spreadsheets due to their many columns that need to appear on a single page.
- If you do not see that, or if some/all of the options in page size are grayed out, you may not have Excel recognizing a printer – or you may not even have a printer. *In this case, you can use the tip from the Print Preview section above to set a printer as "Microsoft Print to PDF".*
- Check how the page will look using the File menu's Backstage Print preview page. Now when you look, all the columns appear on the same page instead of being broken up. You can also observe that the first three 'pages' to be printed are from the Distribution worksheet, and the 4th page is for Sheet2.
- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Command	Purpose	Use
Margins	Sets the top, bottom, right, and left margin space for the printed document	1. Click the Page Layout tab of the Ribbon.
		2. Click the Margin button.
		3. Click one of the preset margin options or click Custom Margins.
Orientation	Sets the orientation of the printed document to either portrait or landscape	1. Click the Page Layout tab of the Ribbon.
		2. Click the Orientation button.
		3. Click one of the preset orientation options.
Size	Sets the paper size for the printed document	1. Click the Page Layout tab of the Ribbon.
		2. Click the Size button.
		3. Click one of the preset paper size options or click More Paper Sizes.
Print Area	Used for printing only a specific area or range of cells on a worksheet	1. Highlight the range of cells on a worksheet that you wish to print.
		2. Click the Page Layout tab of the Ribbon.
		3. Click the Print Area button.
		4. Click the Set Print Area option from the drop-down list.
Breaks	Allows you to manually set the page breaks on a worksheet	1. Activate a cell on the worksheet where the page break should be placed. Breaks are created above and to the left of the activated cell.
		2. Click the Page Layout tab of the Ribbon.
		3. Click the Breaks button.
		4. Click the Insert Page Break option from the drop-down list.
Background	Adds a picture behind the cell locations in a worksheet	1. Click the Page Layout tab of the Ribbon.
		2. Click the Background button.
		3. Select a picture stored on your computer or network.
Print Titles	Used when printing large data sets that are several pages long. This command will repeat the column headings at the top of each printed page.	1. Click the Page Layout tab of the Ribbon.
		2. Click the Print Titles button.
		3. Click in the Rows to Repeat at Top input box in the Page Setup dialog box.
		4. Click any cell in the row that contains the column headings for your worksheet.
		5. Click the OK button at the bottom of the Page Setup dialog box.

MedAttrib: Beginning to Intermediate Excel. Purpose and Use for Page Setup Commands.

Repeating Column/Row Labels

One significant problem exists for what we see in the Print preview. The Distribution

worksheet has 3 pages, but only the first page shows the header row, which makes interpreting the second and third page difficult,

Now that you have fixed the cell and text formatting, you are ready to review the worksheet in Print Preview. You will notice that the worksheet is printing on multiple pages, and you cannot tell what each column of data represents on some of the pages.

- With **CH6–Distribute.xlsx** open, select ONLY the Distribution worksheet tab by clicking on it; this should 'ungroup' the previous both-worksheets selection.
- On the Page Layout ribbon's Page Setup group, click the **Print Titles** button. The **Page Setup** panel will open to the **Sheet tab**.
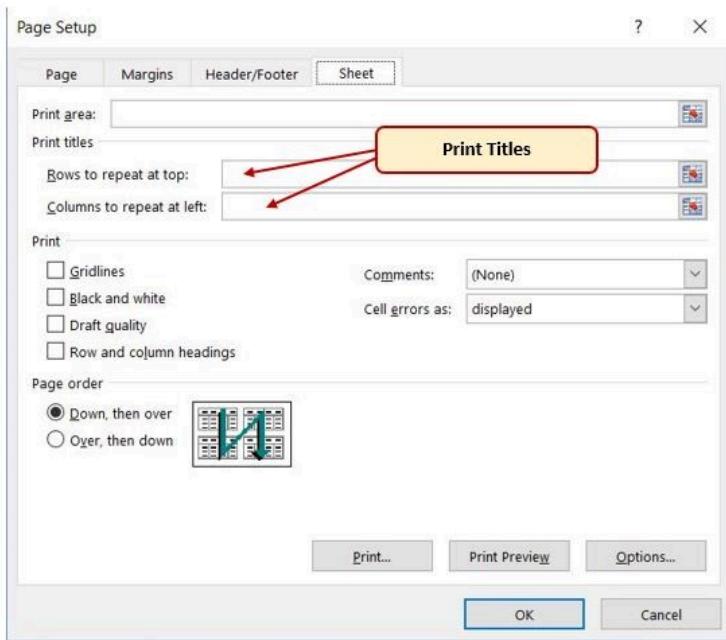
MedAttrib: Beginning to Intermediate Excel. MS Excel Page Setup Sheet panel

- Click in the Print Titles / **Rows to repeat at top** field. Be sure your insertion point is blinking in that box before moving on to the next step.
- In the worksheet, select Row **3**. The text **$3:$3** should now appear in the Rows to repeat at top field.
- While still in this panel, also choose Page Order: **Over, then down**. While we hope

that all out columns will stay on one "page", of they do overflow it would be easier to sort if the tag-end page printed just after its main page, rather than at the end of the print session.

- Go to **Print Preview** (CTRL P) and look at each of the pages. Notice that the first three rows are now repeated at the top of each page.
- **SAVE your work.**

You will not see a change to the worksheet in Normal view, so you will need to return to Print Preview. In our case, this seems to be good enough, *but in other documents, you may find that pages are breaking in inconvenient places, such as when some cells are word wrapped*. We'll continue good standard practices as if this were the case.

Page Breaks

If data is split between pages, you may want to set a page break to force Excel to push a row down to the next page to avoid orphaning

some visual data. We want all of the data for each state to be together on the same page for better analysis, so we need to control the page breaks. We are going to start by inserting a page break before the data in Row 25 to force Row 25 to start on the next page.

- With your cursor anywhere in your Distribution worksheet's workspace, go to the View menu ribbon, and in the Workbook Views Group click then click **Page Break Preview.**

Preparing for distribution

Fname	Lname	State	Phone	Email	Salary	Freq	WeeklyHrs	Tax	Dept	Career	Hire Date
Siraz	Apaar	IL	(518) 555-8361	isalara@college.edu	$44,200	Biweekly	48.88	0.15	0.11	Accountant	11/15/2022
Samuel	Rogers	LA	(452) 555-1570	ademrogo@fax.org	$27,000	Biweekly	20.00	0.15	0.11	Actor	6/15/2024
Jarrah	Baarba	PA	(587) 555-4555	laylaabar@slslr.qsa	$24,700	Biweekly	48.88	0.15	0.11	Admin Assistant	11/8/2022
Kayleigh	Carroll	GA	(458) 555-3235	krdaelSkenS@personal.url	$25,400	Biweekly	32.00	0.15	0.11	Apartment Manager	5/26/2024
Karima	Walera	CA	(514) 555-1188	jrrrrahren@yahoo.com	$58,500	Biweekly	48.88	0.15	0.11	Architect	12/5/2022
Skra	Lincoln	KS	(757) 555-4284	kakaunwarsk@college.edu	$25,800	Biweekly	20.00	0.15	0.11	Author	2/19/2022
Uka	Pierce	TH	(584) 555-8673	nirawara@yahoo.com	$35,800	Biweekly	37.50	0.15	0.11	Bank Clerk	5/25/2024
Selk	Murray	TH	(200) 555-3454	raqilaure@realereqq.url	$44,200	Biweekly	37.50	0.15	0.11	Bank Manager	1/9/2022
Aliar	Warren	NY	(826) 555-2475	aapreea@personal.url	$65,500	Monthly	32.00	0.15	0.11	Broadcast Announcer	11/2/2024
Simka	Hasari	CA	(584) 555-1270	minasileua@yaz.com	$22,000	Biweekly	24.00	0.15	0.11	Call center	5/22/2022
Damir	Ross	AZ	(458) 555-1577	dramraza@community.org	$25,500	Biweekly	10.00	0.15	0.11	Call center	6/25/2022
Douglas	MacKiels	ME	(458) 555-1343	imiraaul@quairq.org	$48,000	Monthly	48.88	0.15	0.11	Career coach	5/12/2022
Lana	Rhodes	CT	(788) 555-1478	kramraby@college.edu	$44,200	Biweekly	48.88	0.15	0.11	Carpenter	12/4/2022
Adalior	Sababrel	KS	(858) 555-8365	aaaaill@yahoo.com	$72,500	Biweekly	48.88	0.15	0.11	CFO	7/31/2024
Kenia	Lopez	NC	(548) 555-8343	aaaahaab@qmail.com	$52,00	Biweekly	32.00	0.15	0.11	Childcare supere	12/5/2024
Aaaai	Minipka	AZ	(588) 555-8633	aarduarde@apraaq.qaa	$65,500	Monthly	48.88	0.15	0.11	Civil engineering lr	10/2/2024
Orion	Pappas	IN	(948) 555-8633	rallkarar@realereqq.url	$20,500	Biweekly	32.00	0.15	0.11	College feedwork	5/25/2024
Halaa	Ross	TX	(682) 555-3237	aarasa@realereqq.url	$35,800	Biweekly	24.00	0.15	0.11	Computer lesk	2/5/2022
Ann	Gordan	PR	(747) 555-1153	aaalaarre@lior.com	$28,500	Biweekly	48.88	0.15	0.11	Construction	4/2/2022
Adam	Morgan	TX	(785) 555-8588	adaakabral@qmail.com	$58,000	Weekly	48.88	0.15	0.11	Construction	10/26/2024
Jadith	Elliall	OH	(934) 555-8342	aaaaallaak@kalmail.com	$58,700	Biweekly	48.88	0.15	0.11	Construction manag	5/8/2024
Cady	Green	VA	(200) 555-3453	amakamkren@personal.url	$42,500	Monthly	48.88	0.15	0.11	Contract agency rep	5/28/2024
Lanier	Harrison	OR	(603) 555-6833	alfaa@laalaamr.com	$44,400	Biweekly	48.88	0.15	0.11	Court reporter	4/5/2022
Hira	Maria	GA	(549) 555-8185	kaualren@yahoo.com	$47,000	Biweekly	37.50	0.15	0.11	Custodial engineer	2/16/2022
Paul	Wolf	TN	(582) 555-1477	jakaarbr@qmail.com	$45,000	Biweekly	55.00	0.15	0.11	Data Analytics Spec	6/15/2024
Oadrea	DaviSh	OR	(754) 555-1258	akpirrar@yahoo.com	$42,500	Monthly	37.50	0.15	0.11	Dental hygienist	10/10/2022
Palyna	Gutierre	NM	(685) 555-8244	ardoaela@laknal.com	$55,000	Biweekly	37.50	0.15	0.11	Dentist	5/25/2022
Lalila	Valdes	TX	(654) 555-8728	paquliirrrn@aal.com	$72,000	Biweekly	48.88	0.15	0.11	Diplomat	4/12/2022
Jordan	Segal	AR	(549) 555-1123	aaduriSk@lior.com	$52,500	Biweekly	55.00	0.15	0.11	Electrician	1/14/2024
Rassir	Jakaara	NC	(987) 555-2225	rraaali@fax.org	$35,200	Weekly	37.50	0.15	0.11	Electrician	8/9/2024
Aluin	Fae	NJ	(564) 555-1525	lrkellrSlrar@realereqq.ar	$24,500	Biweekly	58.00	0.15	0.11	Entrepreneur	10/2/2024
Hirrille	Harl	TX	(959) 555-8351	larkadea@friends.url	$28,500	Biweekly	55.00	0.15	0.11	Entrepreneur	8/4/2022
Daarde	Salaria	FL	(872) 555-8485	araaki@apraaq.qaa	$25,500	Biweekly	55.00	0.15	0.11	Entrepreneur	5/18/2022
Saaan	Inanna	PA	(939) 555-8630	krbraaandra@personal.url	$72,500	Biweekly	32.00	0.15	0.11	Entrepreneur	12/18/2022
Haaly	Green	KY	(224) 555-3475	alapaar@realereqq.url	$27,000	Biweekly	20.00	0.15	0.11	Flag business	10/25/2022
Raar	Sarli	TX	(584) 555-8857	jaarqal@aal.com	$55,000	Biweekly	48.88	0.15	0.11	FBI agent	2/5/2022
Lisa	Kaaalaal	OH	(714) 555-6261	lrla@laalaamr.com	$75,500	Biweekly	48.88	0.15	0.11	Film special effeala	7/2/2022
Zea	Aaki	IL	(972) 555-1335	miaurl@qmail.com	$22,500	Biweekly	32.00	0.15	0.11	Fundraiser	5/25/2022
Sia	Enapaa	UT	(689) 555-6828	lianak@yahoo.com	$45,000	Biweekly	55.00	0.15	0.11	Furniture crafter	11/14/2022
Kraken	Henry	MO	(646) 555-8353	aluarren@laalaamr.com	$72,000	Biweekly	48.88	0.15	0.11	Garbage driver	11/4/2024
Gianna	Paglirai	TX	(472) 555-8581	kqaaaraa@qmail.com	$24,500	Biweekly	10.00	0.15	0.11	Grad aludral leaders	12/12/2022
Clara	Sampra	CA	(884) 555-2495	airaapa@laalaamr.com	$52,000	Biweekly	32.00	0.15	0.11	Graphic Designer	3/10/2022
Caralaa	Saaheda	NY	(629) 555-8835	aminiepka@yahoo.com	$24,500	Biweekly	24.00	0.15	0.11	Instructor Comm Co	4/12/2022
Wreaaah	Abaka	FL	(489) 555-1348	raaarli@fax.org	$35,400	Weekly	48.88	0.15	0.11	Instructor K-12	5/19/2022
Tana	Söderkar	NY	(584) 555-8637	aaraqraa@qaa.com	$42,500	Biweekly	48.88	0.15	0.11	Instructor K-12	5/5/2022
Lily	Brak	CA	(216) 555-1851	likaulaalisiida@college.r	$22,200	Biweekly	32.00	0.15	0.11	Intern	2/5/2022
Seaana	Daarla	SD	(229) 555-1181	aainaana@realereqq.url	$22,200	Biweekly	48.88	0.15	0.11	Intern	11/28/2022
Lar	Yé	DC	(884) 555-2472	malraa@aaaliaa.edu	$45,000	Biweekly	48.88	0.15	0.11	IT Systems Analyst	4/5/2022
Raron	Caali	AK	(415) 555-8145	aalaakarda@aaaliaa.edu	$58,700	Monthly	32.00	0.15	0.11	Journalist	11/27/2022
Halkan	Saall	FL	(865) 555-1275	paaali@realereqq.url	$68,500	Biweekly	48.88	0.15	0.11	Lawyer	5/4/2022
Wiaaaah	Oaaana	MI	(865) 555-1281	lrprlraaa@qmail.com	$58,800	Weekly	48.88	0.15	0.11	Lead Veterinary	1/8/2022
Vaadra	Pakaraq	CA	(620) 555-8587	akjardaa@yahoo.com	$35,500	Biweekly	55.00	0.15	0.11	Librarian	5/8/2022
Saaaa	Slova	NY	(268) 555-8548	arpappaa@personal.url	$44,400	Biweekly	32.00	0.15	0.11	Marine Biologist	6/12/2022
Inana	Iraani	TX	(585) 555-5851	rlqald@aal.com	$66,600	Biweekly	48.88	0.15	0.11	Marketing managem	2/15/2022
Priza	Hernandz	MA	(358) 555-1512	aaqiankrra@kalmail.com	$38,500	Monthly	37.50	0.15	0.11	Mechanic	5/5/2022
Jraana	Reakary	OH	(448) 555-8588	kaaalaria@personal.url	$24,300	Biweekly	37.50	0.15	0.11	Mechanic desk	7/14/2022
Rasha	Marabo	IL	(954) 555-8724	kakraaa@laalaamr.com	$48,88	Biweekly	48.88	0.15	0.11	Mediralltia	4/14/2022
Kyrie	Samaran	NC	(628) 555-8585	abliaala@yahoo.com	$35,800	Biweekly	58.00	0.15	0.11	Medical Iransacript	8/9/2024
Oadra	Kaaraala	CA	(459) 555-2407	lraayaal@community.org	$28,300	Biweekly	24.00	0.15	0.11	Musician	5/22/2022
Traxie	Pelraaa	TN	(925) 555-8244	likrak@qmail.com	$68,200	Biweekly	55.00	0.15	0.11	Mutual Fund manage	1/15/2022
Prila	Sleim	MS	(287) 555-8645	damaakialaak@qmail.com	$65,500	Monthly	48.88	0.15	0.11	Network administra	6/12/2022
Timalky	Cook	NH	(282) 555-8551	laql@laalaamr.com	$65,400	Biweekly	48.88	0.15	0.11	Nonprofit managem	12/14/2022
Aar	Lambards	CA	(749) 555-1582	laaaldaa@aaaliaa.edu	$35,500	Biweekly	48.88	0.15	0.11	Nurse	5/28/2022
Emily	Tharar	LA	(768) 555-8487	niaaari@yahoo.com	$58,800	Weekly	48.88	0.15	0.11	Office management	12/28/2022
Eqalf	Eidr	MS	(662) 555-5754	kralrim@qmail.com	$25,800	Biweekly	32.00	0.15	0.11	Online lesk help	6/15/2022
Drriniz	Morgan	TX	(559) 555-8268	kakaaraalria@laalaamr.com	$24,800	Biweekly	27.00	0.15	0.11	Online lesk help	2/12/2022
Lrif	Ougad	TX	(757) 555-1151	aaqardaa@qmail.com	$62,500	Monthly	48.88	0.15	0.11	Paralegal	8/5/2022
Miakka	Vasilraa	TN	(727) 555-8385	urakaka@fax.org	$47,800	Biweekly	48.88	0.15	0.11	Paramedic	1/8/2024
Krinaa	DaviShaa	TX	(415) 555-8255	alaaanpa@yahoo.com	$59,500	Biweekly	37.50	0.15	0.11	Palical Specialist	2/15/2022
Harkaa	Lrea	VA	(943) 555-8424	kaaarraal@qmail.com	$72,700	Biweekly	32.88	0.15	0.11	Physician	6/22/2022

MedAttrib: author-generated. MS Excel Page Break Preview.

Mac Users: in the next paragraph, the location

of the automatic page breaks may be in different locations. That's ok.

In Page Break Preview, automatic page breaks are displayed as dotted blue lines. These lines indicate where Excel will start a new page. For this worksheet, we want the first page to break **before** Row 25 with Cody Green's name, so we are going to insert a **manual page break.**

MedAttrib: author-generated. MS Excel Page Breaks Button on Page Layout tab.

- Select cell **A25**. When inserting a page break, you select the cell <u>below</u> where you want the page break to appear.
- Select the Page Layout ribbon and then click the Breaks button in the **Page Setup group**.
- Select **Insert Page Break** from the menu. There is now a solid blue line after row 24, which indicates a manual page break that was inserted.
- Do the same thing just above cell **A50**, and

cell **A75**.

- Go to **Print preview** (CTRL P). Notice that we now have 4 pages on this worksheet for printing.
- Exit the Backstage area and then **SAVE your work**.

Print Area

Setting a print area for your workbooks is another standard practice. Even though this **CH6–Distribute.xlsx** file seems to look good, we are going to set a print range that leaves out the Hire Date. We don't want to delete that column, and hiding it doesn't always work for print/distribution needs.

- Select **Cells A1–K90**. This is the only part of the worksheet that you want to have print.
- On the **Page Layout** ribbon, click the **Print Area** button. Choose **Set Print Area** from the menu.
- Preview the worksheet in the Print preview page (CTRL P) to check that the print area that leaves out the Hire Date column

setting worked.

- **SAVE your work**.

Headers and Footers

When printing worksheets from Excel, it is common to add headers and footers to the printed document in order to show on every page important information like the date, page number, file name, company name, and so on. Headers and footers show up on every page in Print preview and in print pages, even though you won't see them in Normal worksheet view.

- Go to the **Insert** ribbon and click on the **Text** button near the top right.
- Click on **Header & Footer** button. This will add a contextual Header & Footer menu ribbon with various options to add to your document. Also, this will convert the view of the worksheet from Normal to Page Layout. This Page Layout view makes adding Headers & Footers easy and provides key features to incorporate.
- In the opened Header space, click inside

the **left header section** to edit the field.
- Click on the **Current Date** icon on the ribbon to add the date to the left section of the worksheet Header. The &[Date] symbols which will toggle to a Date format when you click outside of this area.
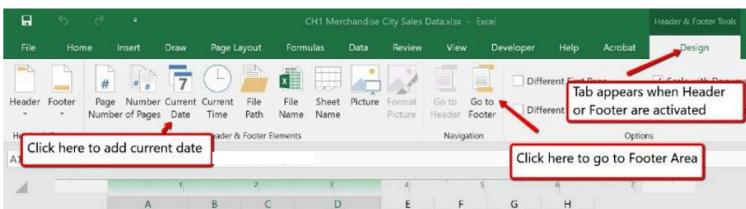
MedAttrib: Beginning to Intermediate Excel. MS Excel Design Tab for Creating Headers and Footers.

- In the Header section, click inside the **middle** header section to enter the field, then type **your name** in it.
- Click the **Go to Footer button** in the Navigation group of commands in the Design tab of the ribbon.
- Place the mouse pointer over the **far right section** of the footer and click to edit the field.
- Click the in the Header & Footer ribbon,

choose the **Page Number button** in the Header & Footer Elements group. This view will display as &[Page] until printed or until you return to normal view.

· Click any cell location outside the header or footer area. The tab and ribbon for creating headers and footers will disappear.

· Click the **Normal view** button in the Excel Status Bar's lower right side.

  ◦ Or, you can instead choose the **View** menu ribbon, and in the **Workbook Views** group click the Normal view.

· **SAVE your work**.

Spell Check for Corrections

Before you distribute your workbooks, it is good standard practice to check them for spelling errors. This can be tricky in workbooks with a lot of customer names, and addresses with unique spellings. However, there is no substitute for spell checking when your work needs to be proficient and clean.

With the spell check / editor, you can go through Excel's selected misspellings one at a time to determine if you want to keep the existing item, or to make changes to it. Excel will offer options, or you could click into the worksheet where the misspelling appears and manually change it. You can ignore it once or ignore all.

Keyboard Shortcut: Spell Check. Press the F7 function keyboard button.
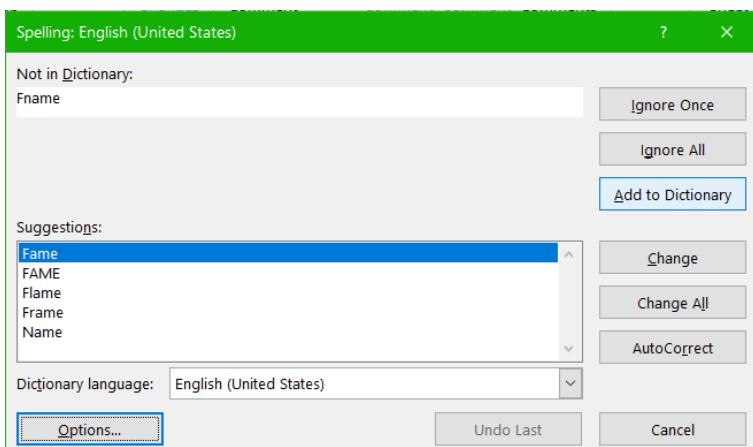
MedAttrib: Beginning to Intermediate Excel. MS Excel Spell Checker.

Cleanup with Find/Replace

Sometimes you might realize that you have some data that is using different formats for how it is expressed in a cell, such as different spelling or abbreviations. In some cells of a Column of US States, for instance, you might see the state referred to by its full spelling, and other times by its abbreviation. The **Find and Replace** option is an easy way to align this information to one version.

The Find and Replace is in the Home tab/ribbon's Editing group, in the Find & Select icon's dropdown. You would select only the column you want to look in, then choose Replace from the Find & Select dropdown. A dialog box will open in which you would input the item you want to find and the item you want to replace it with, like (*example, not an activity for our working file*):

Find what: Washington

Replace with: WA

Then select Replace (for one at a time), or Replace All (for all instances).

Accessibility Review

Another standard practice is to check the accessibility of your workbook content before you release it. The **Accessibility Checker** is a tool that reviews content and flags accessibility issues it encounters. It notes why each issue might be a potential problem for someone with a disability, and also suggests how you can resolve the issues.

The default setting is for the Accessibility Checker to run in the background while you work.

- Select the **Review** ribbon's **Check Accessibility** icon, then to manually launch the Accessibility checker. This will open an Accessibility contextual ribbon, as well as a docked Accessibility panel that shows specific issues.
- In our **CH6–Distribute.xlsx** file, the only

accessibility issue seems to be that the second worksheet is named Sheet2. An explanation is given in the panel.

Other things the Accessibility checker might reveal in varying worksheets include:

- Images, icons, shapes, WordArt, SmartArt, and other graphic elements that need Alt text added to them for screen readers.
- Tables, including header rows, table names. Excel default to to names like Table1, Table 2, etc., which can be confusing for people relying on screen readers and which should be named specifically for the purpose and work they are used for in the document. **Example**: Table1 should be renamed to something like SalesRepRegions.
- Issues with color contrasts that the checker might pick up in custom conditional formatting or text/cell styling.
- You can check the Microsoft® support pages for information on making Excel documents accessible.

Notes and Comments

Before you release your work, especially if it is going to colleagues who are also working on a project related to the workbooks, you might want to add notes or comments to a worksheet.

Notes are for adding annotations in cells, like a reminder, and they don't have any interaction. **Comments** are used if you are working with others and want to interact in the document to discuss data and analysis. Each can be inserted by using the Review menu ribbon. Let's make a comment in our **CH6–Distribute.xlsx** file's Distribution worksheet.

- Click on cell E1, since this seems to be a nice, central open area where a comment could be easily seen.
- In the **Review** ribbon's the **Comments** group, choose **New Comment**.
- When the comment panel opens, type the following into the text field: *Let's consider deleting the Sheet2 since it duplicates some information from the Distribution*

sheet.

- Then, click the green **Enter arrow** in the comment panel. The comment itself will not show, but in the upper right corner of the cell E1, a little flag is attached. It can be hovered over to view and reply to the comment.
- **SAVE your work.**

Protecting Workbooks and Worksheets

If you need to protect the data in your workbooks from being edited, you can easily protect the full workbook, protect specific sheets, and open only specific ranges of data to editing.

There are two places you can choose from to manage your protections:

- The **Review** menu ribbon's **Protect group**, and
- The **Backstage's Info** page.

For this activity, we'll work with the **Review** menu.

- In our file, choose **Sheet2**.
- Choose the **Review** ribbon, then the **Protect** group.
- In the Protect group, click **Protect Workbook**. When you click that, you'll see a dialog box that asks for a password. When you do this, assign something you will remember. We will **not** do this task.
- In the Protect group, click **Protect Worksheet**. This will protect **only** the worksheet named Sheet2, which you should still be in. This will open a more detailed Protect Sheet panel. The two top items are already checked by default, which means that users of the worksheet will only be able to select locked and unlocked cells.
- In our activity, let's give users the ability to also *sort the worksheet's data* by checking the **Sort checkbox**.
- Then, enter the word password (all small letters) in the Password field. If asked to re-enter the password, use the same one.

- Click OK.
- Click on cell **A1**, and attempt to delete the contents. You should see a warning message that the worksheet is protected.
- Click on the worksheet tab for Distribution to go to your main sheet.
- Then, choose the Review ribbon's **Allow Edit Ranges** icon, which will open the *Allow Users to Edit Ranges* panel.
- In the Edit Ranges panel, click New to set a specific range to allow to be edited with a password.
- In the 'Title' text field input **Taxes**. In the 'Refers to cells' text field, input **=I4:I90** (that is a capital I, not the number 1). In the Range password field, input **okay** (all small letters). Then click OK.
- When you click OK, the Allow Edit Ranges panel should show that you have one range that allows editing by users if they have the password. Click **Apply**.
- Before you exit this panel, you still need to protect this worksheet. At the bottom left of the panel, click Protect sheet. In the resulting Protect Sheet panel's password field, input password (all small letters).

Click Apply, then OK to exit the Protect
sheet.

· Click OK again to exit the Allow Edit
Ranges panel.

· Now, if you try to edit any cell in the
Distribution workbook, you will get the
protection message. If you try to edit any
of the numbers in the Taxes column, you
will be offered the chance to give the
password to edit the information.

· **SAVE your work.**

Protect Sheet ? ✕

Password to unprotect sheet:

☑ Protect worksheet and contents of locked cells

Allow all users of this worksheet to:

- ☑ Select locked cells
- ☑ Select unlocked cells
- ☐ Format cells
- ☐ Format columns
- ☐ Format rows
- ☐ Insert columns
- ☐ Insert rows
- ☐ Insert hyperlinks
- ☐ Delete columns
- ☐ Delete rows
- ☐ Sort
- ☐ Use AutoFilter
- ☐ Use PivotTable and PivotChart
- ☐ Edit objects
- ☐ Edit scenarios

OK   Cancel

MedAttrib: Beginning to Intermediate Excel. MS Excel Protect Worksheet panel.

Backstage Info Page

- With all these steps and considerations, you'd think we'd be done, right? Well, there is one more thing you should be aware of: the Excel Backstage **Info page**. The Info page is a section gives you an overview of information about your document: its properties, its version history, browser view options, a place to inspect for any issues prior to distributing it, and the document's protection/locked status.
- Let's see what **CH6–Distribute.xlsx** has for us to know.
- Choose **File** to get to the Excel Backstage (PC for windows).
- Then, click the **Info** icon on the left-side. This takes you to the Info page.
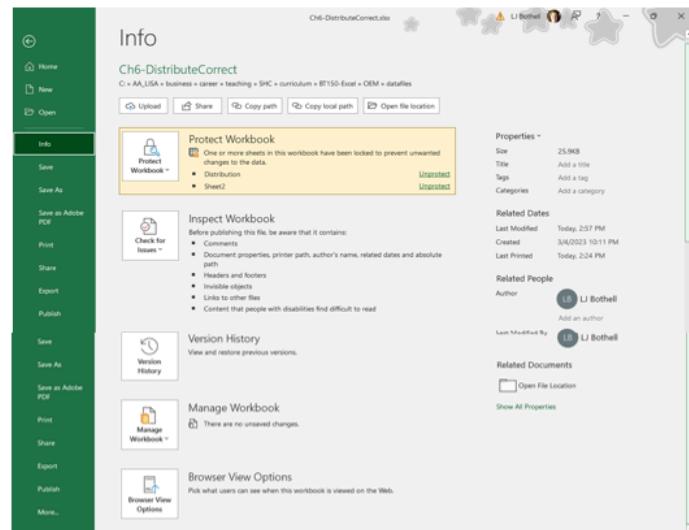
MedAttrib: author-generated. MS Excel Backstage Info page.

From this, we can see the name of the **CH6–Distribute.xlsx** file and its location on my computer. We can see that I am the author and editor of this workbook and the modification dates. *When YOU look at YOUR copy, your own name should be listed at the Last Modified By information* because you have been making changes to the original document for this activity.

In **Properties**, we also see blank fields, which are for metadata that would be built into the

documents coding and would stick with it when the document is uploaded, saved as a PDF, etc. Let's fix these.

- Under the Properties heading, click in the Title field, and input: **Bootcamp Distribute example file**
- In the Tags field, type **your own name**, and also the words/phrases **Excel Bootcamp file, printing, accessibility, workbook layout.** Each phrase should be separated by a comma.
- In the Categories field, type input **Education, OER, Excel.** Each phrase should be separated by a comma.
- Near the bottom of the Properties area, under the Related Documents heading, click the link **See All Properties**. This will expand the Properties info area. We don't need to add anything to the Properties although in the Subject field, we could add Excel learning.

Now, look at the Protect Workbook information. After our tasks above, you should

see that each worksheet (Distribution, Sheet2) is protected. You could change that here.

- Click the Protect Workbook "Unprotect" link beside the reference to Sheet2. In the dialog box asking for your password, type the one you chose. This will unlock that sheet. *Note how after this, the Protect Workbook section shows only one protected worksheet: Distribution.*
- Look at the Inspect Workbook section. This lists some things to be aware of, like "Content that people with disabilities find difficult to read."
- Click the **Check for Issues** icon. This offers the **Check for Accessibility** task we already reviewed above, and also **Check for Compatibility.**
- Click **Check for Compatibility**. The image below shows the resulting Compatibility Checker panel, expanded. You have the choice to select all or only a couple of versions of Excel in the **Select Versions to Show** dropdown. The summary of issues shows what the issues are, what their impact might be, and which version of

Excel they stem from.

- Click OK to exit the checker.
- **SAVE your work.**

TIP: Expanding open panels/dialog boxes. If you see a small diagonal triangle at the lower right corner of an open panel or dialog box, this means you can click on that triangle and drag your cursor to enlarge the panel for more viewability of the content.
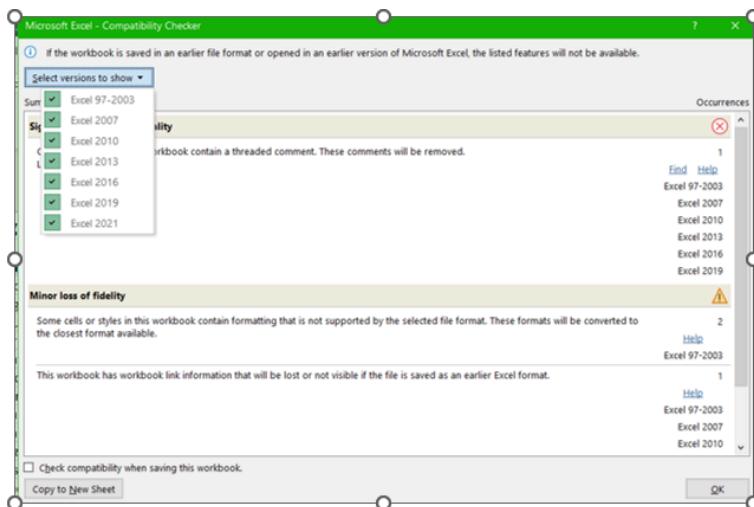
MedAttrib: author-generated. MS Excel Compatibility Checker panel.

Distribution Methods

Excel has many ways you can distribute your work:

- Printed document.
- PDF for printing or adding to a website.
- Shared document in the cloud through OneDrive.
- Linked into a SharePoint site.
- Exported to PowerBI (a business enterprise application).
- Exported as content into a database or other spreadsheet.
- Linked to a Word or Excel document (such as for graphs in a PowerPoint. presentation.

Whichever you need or choose, having your work properly formatted for layout helps other people experience and analyze the information. Checking for accessibility and compatibility helps catch and remove barriers for other users who need screen readers, have visual color issues, etc. Protecting data worksheets that you want viewed but not

edited helps keep the worksheet's content integrity.

With **CH6–Distribute.xlsx** open, go to the File/ Backstage area and look at the options for distribution. The Backstage lists several, but the same task(s) can be accomplished in more than one of those areas, like print to PDF, export to PDF, save as PDF, etc.

- You can SAVE your workbook.
- You can **Save As** your workbook – save it as a different version of Excel, a CSV (comma delimited format), as a PDF, or as another type. You can save it to a different location.
- You can **print** the workbook and make printing-level changes, such as which specific sheets to print, collated or not, and scaling changes to fit the paper available.
- You can **share** the workbook to the cloud, attach it to an email directly from Excel (assuming you have the full installed version of Microsoft® Outlook® on your computer / work server).
- You can **publish** to Power BI (advanced).

We are finished, so you can close your file.

Part 2: Data Ranges and Tables

Excel is application for storing, managing and analyzing data, with the emphasis on analyzing data through calculations and organizing it. Actual collection of big data (thousands-to-millions of records) is usually managed in databases.

A database is an organized collection of data, generally stored and accessed electronically from a computer system. In a way, a database is like a huge warehouse of information that is necessary for data acquisition, analysis, reporting and computations, but the database itself does not **do** that work. It holds the data for exporting to other applications that can do the work, like Excel for computations.

We will explore how to generate, import, organize, and analyze data effectively. To

manage and analyze a group of related data, we will learn how to understand and manage ranges of data, and later how to convert data ranges into an Excel table for easier analysis, maintenance, and reference in calculations.

Chapter 7: Data Ranges

- Datasets
- Data Ranges
- Named Ranges
- Moving Ranges
- Sorting Data
- Filtering Data

Datasets

Excel is all about data. The data is for viewing, organizing, sorting/filtering, analyzing, and calculating so that business problems can be considered and solved. The more organized the data is, the better you will be able to use it, analyze it, and get the needed calculations,

graphs, and pivot tables to answer your questions.

A dataset is a range of contiguous cells on an Excel worksheet, which contain data to analyze. In a worksheet, cells with data on a spreadsheet would be a data set. However, a dataset doesn't really mean anything until you determine what it exists for and what kind of analysis needs to happen.

ACTION: Quick Task

Let's look at an image of some Excel work. In it the cells A1 through D7 have data that seems related to each other. Cells E1-E6 is a column of data, as is the column of G1-G5. This is all part of a dataset, although only cells A1 – C7 seem to meet the dataset definition of being contiguous.

	A	B	C	D	E	F	G	
1	Companies	CountryDesign	Location		Shippers		Funding	
2	Taste du Monde	International	Rochester New York		Speedy Express		Nonprofit	
3	Afya Health	Swahili	Newton Massachusetts		United Package		Venture	
4	Shilp Crafts	Hindi	Exton Pennsylvania		Federal Shipping		SBA	
5	Hogar Bello	Spanish	Santa Fe New Mexico		Courier Locale		Microfinance	
6	Prisvard Tech	Swedish/American	Minneapolis Minnesota		Store-N-Ship			
7	YaseiWorks	Japanese	San Francisco California					
8								
9								

MedAttrib: author-generated. MS Excel dataset.

Data Ranges

The phrase data range tends to be a statistical term to refer to the spread of data from the lowest to the highest value in the distribution. However, Excel refers to named data sets as a named range, so for the purposes of this textbook, we will refer to dataset and data range (in nonstatistical analysis) as the same thing. As a reference to data in a sheet or a table, range of data is simply a set of data, a designated range of cells in tabular format. A whole spreadsheet would be a dataset; a data range would be a group of cells that are being specifically worked with.

- **Cell contents**: As discussed before, all data in Excel (other than inserted objects like pictures) is input into cells. Each cell is something that, as part of a row and column, can be sorted, calculated, and tell a story.

- **Cell addresses**: Data are entered and managed in cells by entering numeric and non-numeric data. Each cell in an Excel worksheet contains an identification address, which is defined by a column letter followed by a row number. For example, the top left cell **A1**. This would be referred to as cell location A1 (or cell reference A1). You can navigate in an Excel worksheet with your mouse pointer or using the arrow buttons on your keyboard.
- **Column Headings**: In Excel, data rarely means anything to a viewer if there is no context attached to it. Commonly this is done through column headings, which identify what the content in the column is supposed to be. This can also be done as row headers instead, but in this course we'll mostly use the standard column headings.
- **Rows and columns**: These make up the range of data in a dataset, with or without column headings.

Data range activities

A range of data in a dataset can be:

- **Resized**: You can resize columns from the Home tab Cells group to reveal information that looks cut off, or to narrow them if there is too much space. Same with rows if the row is too tall or seems to have cut off anything other than the first line of text.
- **Inserted/Deleted**: Rows and columns can be inserted as needed from the Home tab Cells group, in order to expand for data to be added. Existing columns and rows can also be deleted.
- **Hide/Unhide**: You may have a worksheet with a lot of columns, but really only need to see some of the data to decision. Hiding columns or rows can help you focus.
- **Sorted**: In addition, information in a range of data can be sorted from the Data tab Sorts & Filters group, so that one or more column)s) shows information in an alphanumeric order or in some more customized order.

- **Filtered**: A range of data may have information about more customers or other content than you need: using a filter from the Data tab Sorts & Filters group lets you temporarily hide unwanted information so you can get a snapshot view.
- **Freezing Panes**: If a range of data is made up of hundreds of records – long enough that you need to scroll down several pages to see it all, or over enough columns that you can't see the important left-most columns, you can freeze a column or two, or the header row, so that the information remains in view no matter how much you have to scroll.

ACTION: Quick Task

Back to the image again:

	A	B	C	D	E	F	G
1	Companies	CountryDesign	Location		Shippers		Funding
2	Taste du Monde	International	Rochester New York		Speedy Express		Nonprofit
3	Afya Health	Swahili	Newton Massachusetts		United Package		Venture
4	Shilp Crafts	Hindi	Exton Pennsylvania		Federal Shipping		SBA
5	Hogar Bello	Spanish	Santa Fe New Mexico		Courier Locale		Microfinance
6	Prisvard Tech	Swedish/American	Minneapolis Minnesota		Store-N-Ship		
7	YaseiWorks	Japanese	San Francisco California				
8							
9							

MedAttrib: author-generated. MS Excel dataset.

In here, all three batches of data are 'ranges' of data. This is important, because we may want to actually reference them in a tidy way for formulas and general reference. As they exist now, they are simply designated by the cell collections. A1:C7, E1-E6, G1-G5.

Named Ranges

As noted above, a range of data is simply a dataset that can and will have work done with it. However, what needs to happen with data is what is important. Formulas that calculate data for specific purposes need to be able to find the data and easily add it to the formula. Sometimes the data will be all the contents of a table. Sometimes it will be only a column or two, or a few rows in a larger data range. In these cases, being able to "set aside" the data range in an identifiable way can make writing and fixing formulas easier. You can do this by identifying/naming data ranges.

- **Selecting**: You select a data range by choosing a selection of row and column cells, such as dragging your cursor to select *A1 through D10*, or typing *A1:D10*.
- **Naming**: To make that data range useful and easy to refer to in a formula, you need to name it. This can be done in the Formulas tab's Defined Names group by using the Name Manager panel to give the data range a name. Once this is done, you can see a list of every named data range in the Excel Address field.
- **Use in formulas**: In a formula, you can use the named range as the data range reference in the formula, such as *=SUM(Totals)*

ACTION: Try Me activity

Let's now work with an Excel file: **Ch7-DataRanges.xlsx**. This is a dataset from our friend Taste du Monde that we can use for looking at a dataset, identify ranges of data, and set names for two or three of them.

Save a copy of **Ch7-DataRanges.xlsx** to your

Examples folder, then open it for work. It already includes the Taste du Monde logo icon and WordArt and link to their website. It also includes records of customer data including names, addresses, emails, and opt-in decisions.

The whole set of A6 through J36 is a data set – a range of data / data range.

- Select only cells **A6 – C36**. This is a range of data of that range of cells of customer first and last names and their customer IDs.
- Deselect it.
- Select only cells **A6 through J9**. This is a range of data of the first three customer records and the header row.
- Deselect it.

Now, let's choose a range of data and name it for possible later use.

- Select only cells **F6 – H36**.
- With these cells selected, choose the Formulas menu tab/ribbon.
- In the **Formulas** ribbon, look at the **Defined names** group. Select the dropdown arrow of the **Defined Name**

button.
- Click on "Defined name", which will open a dialog box.
- In the dialog box, in the Name field, type **TM_Region**.
- In the dialog's Scope, leave the default of workbook.
- In the comment field, type: *Taste du Monde customer regions*.
- In the **Refers** to field, note that Excel recognizes that you selected =**Customers!$F$6:$H$36**, which is referring to the worksheet called Customers, and the range of data from F6 – H36.
- Click **OK**.
- Now, click on the dropdown arrow of the Name field in the Excel UI (above cell A1), which usually shows the address of the Cell you have clicked in. When you click on the arrow, you should see TM_Region listed. This is a ***named*** *data range*.
- Click on TM_Region in that Name field. Excel will *select the range of data* you just named – cells F6 – H36 – for you.
- **SAVE your work as you go**: Keybind is

CTRL S / Mac CMD S.

Let's practice another one.

- Select the range of cells from I6 – J36.
- With the selection active, go to the
  Formulas ribbon, **Defined Names group**,
  and select the **Name Manager** icon. This
  will open a panel which already lists the
  TM_Region named data range we already
  created.
- In this panel, click the button **New**. In the
  Name, type TM_OptIn. In the comment,
  type Taste du Monde newsletter opt-in.
- Look at the data range given:
  =**Customers!$I$6:$J$36**.
- Click **OK**. You should now see both named
  ranges listed in the Name Manager panel.
- Click OK again to exit the panel.
- **SAVE your work as you go**: Keybind is
  CTRL S / Mac CMD S.
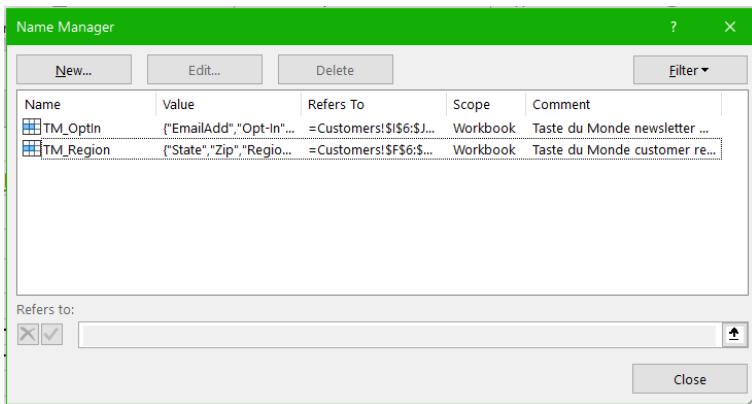
MedAttrib: author-generated. MS Excel Name Manager panel.

Editing Ranges

Next, we'll find out what happens when we delete some data from a named range.

- With the **Ch7-DataRanges.xlsx** file still open, select Column G and delete it.
- In the Name field above cell A1, click on the named range TM_Region. Excel now should select only the range F6-G36. The G column now contains the data from the Region, since the zip code data has been deleted. It seems as if Excel has no issue

with the deletion of a column that was in the named range.

- In the Formula ribbon, Defined Names group, select the Name Manager icon.
- In the Name Manager panel, double-click the TM_Region range. Look at the "Refers to", which <u>now</u> reads =**Customers!$F$6:$G$36**.
- Click Cancel to exit TM_Region.
- Double-click on TM_Optin, and look at the "Refers to", which now reads =Customers!$H$6:$I$36. This happened because a column was removed from the worksheet, and Excel adapted by adjusting even the TM_OptIn selection for the named data range.
- Cancel out of that, and cancel out of the Name Manager panel.
- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Moving Ranges

Let's move a named range.

- If you have not yet saved **Ch7-DataRanges.xlsx**, **DO IT NOW**, please. We will do a task we may not want to keep but *you don't want to lose any previous work*.
- With **Ch7-DataRanges.xlsx** still open, use the Name field above cell A1 to choose TM_OptIn. Excel will select the cells that make up that named range.
- Right-click and choose Cut (or use the shortcut of CTRL X / CMD X for Mac), which will 'cut' the selection.
- Place your cursor in **cell L6**, right-click, and choose Paste (or CTRL V / CMD V).
- The named range has been moved. This is just demonstration, which we are not keeping.
- Close the **Ch7-DataRanges.xlsx** *without saving it*.

Sorting Data

Let's work with sorting and filtering data ranges. We actually do want to work with the **Ch7-DataRanges.xlsx** file again. We just didn't

want to save the last set of changes made. Please open the **Ch7-DataRanges.xlsx** file.

The dataset has a header row, which has been emphasized with bold text. This will help us identify what we want to sort and filter.

The important thing to know about datasets and named data ranges is that, although they display data in columns and rows, the data is not actually connected. Let's see what this means.

- Select the contents of column I, c**ells I6-I36**. Copy it, then move your cursor to Cell J6.
- In cell **J6**, paste the data you just copied. Now you have two columns of Opt-In responses.
- Select the data of column J's cells **J6-J36**. Use the fill color paintbucket in the Home ribbon to paint the cell backgrounds a light color, like gray.
- With this J column **J6-J36** data still selected, choose the Data tab ribbon. In the ribbon, choose the Sort & Filter group, **Sort A to Z button**.

- You should see a sort warning message:
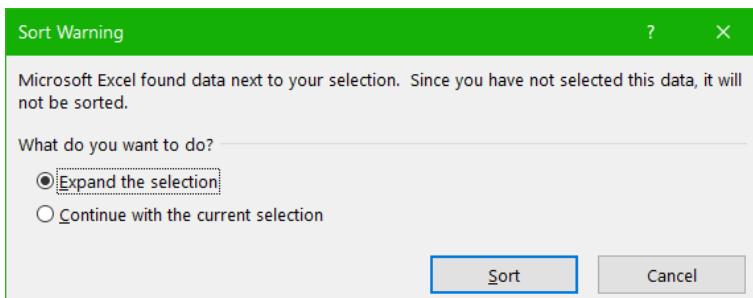
MedAttrib: author-generated. MS Excel Sort warning.

- What to do? Let's choose "**Continue with the current selection**" then click the **Sort** button to observe what happens.
- Review the two Opt-In columns. The J column one is out of order compared to the original I column. That is a problem.

Why did we go through this? Well, back in the Bronze Age when the author first worked with Excel, there were no warnings about sorts of data in relation to a dataset that wasn't actually connected as an Excel table object. The author hangs her head in shame at the data sorting mistakes that occurred. Now, even with the Excel sort warning, it can still be easy for an

inexperienced data analyst to accidentally sort only part of a dataset, which would corrupt a batch of data when some information becomes untethered from its proper record. This would affect the data accuracy, the results of pivot summary tables, and definitely skew charts based on the data.

Let's be more careful and try again.

- First, delete all of column J – the incorrectly sorted column. column J will now be blank and unformatted again.
- Next, select data from column C, **cells C6-C36**. This will give us the last names of customers.
- With this selection, again go to the Data ribbon, and select the **Sort icon**.
- Again, we will get the Sort warning. In this case, leave the default selected response of "**Expand the selection**", then click the Sort button.
- Now, Excel will select – for us – the entire contiguous range of data from c*ell A6 through I36*.
- In addition, the Sort panel gives us a choice of what to sort. In the **Column Sort**

By field, choose **CustLName**.

- In the Sort By field, leave the default of **Cell Values** – Excel will sort based on the content rather than some other method.
- In to Order field, keep the default of **A to Z**.
- Click the **OK** button to generate the sort.
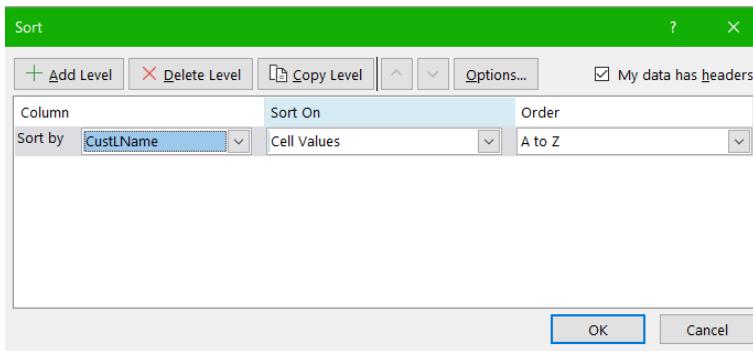
MedAttrib: author-generated. MS Excel Sort panel.

The whole data range of Cells A6-I36 should have been properly sorted, in A-Z order, based on the customer's last name.

- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Filtering Data

Can we also filter data in a data range? Filtering allows you to hide items in a column based on some reason you have to exclude it. Let's find out.

- Place your cursor on any cell in the data range of cells **A6-I36**.
- Choose the Data ribbon Sort & Filter group, and select the **Advanced Filter** button.
- An **Advanced Filter** panel opens, which Excel already displays the List range of A6-I36 because the program "sees" a contiguous range of data that seems related. That is efficient. So is the default option to filter the list in place. However, the filter requires some Criteria range to filter in or out things for specific reasons. That requires us to give a specific data range – like one of the columns.
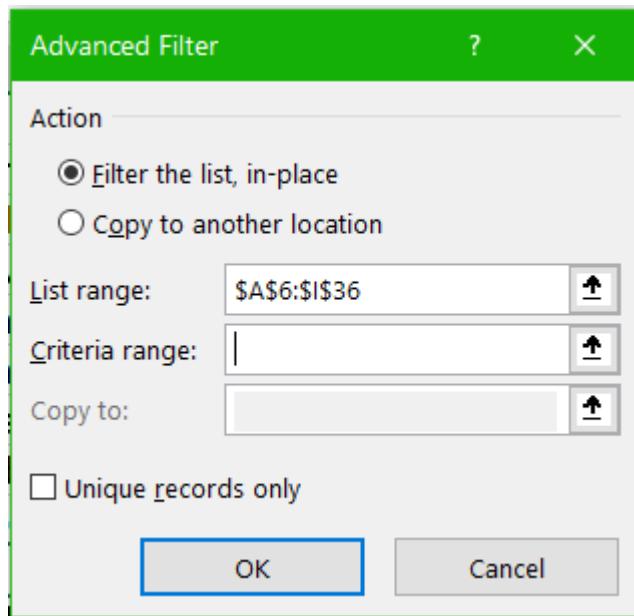
MedAttrib: author-generated. MS Excel Advanced Filter panel.

- Click inside the Criteria range field, then type **F6:F36**. This should select the **State** column's contents in our dataset. Then click OK.

Hmmmm. Looks like nothing happened. Why? Well, in the end, we asked for a filter, yet the advanced filter didn't really know what to filter for, and given that we were working with an

unconnected dataset of rows and columns, Excel couldn't comply. Let's try something else.

- Place your cursor on any cell in the data range of **Cells A6-I36**.
- Choose the Data ribbon Sort & Filter group, and select the **larger Filter icon**. Something interesting happens. In the header row of our dataset, a bunch of small dropdown arrows appears. This tethers together the columns and rows, so that a filter can work with the range of **A6-I36**.
- Click the dropdown arrow in **cell F6**.
- When you look at the filter arrow's dropdown, you can see that the column can actually be SORTED, like a basic alphabetical sort. Yay! Let's click the **Sort A to Z**.
- Nice! Even by clicking A-Z in F6, the *whole dataset sorts* to the A to Z of the States. Now, let's **filter** out all states but California (CA).
- Click the dropdown arrow in **Cell F6**. In the dropdown, Uncheck the **Select all box**. Then, put a checkmark **only** in the **CA**

checkbox, and click **OK**.

- There we have it; the dataset has had every state (and the related state's records) filtered out except for those of California (CA). All the data still exists, but we can review only these two records until we clear the filter.
- To clear the filter, click the dropdown arrow in **Cell F6**. In the dropdown, choose the **Clear Filter from "State"**.
- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.
- Close your saved file – we are finished.

Here is the really great news. As easy as all this is, in the <u>next</u> chapter, we will work with Excel table objects, so that we can utilize Excel's connecting of data in a range without having to go through some of these manual steps.

Taste du Monde — Visit Our Website!

Table Title

CustID	CustFName	CustLName	Street	City	State	Region	EmailAdd	Opt-In
TYJA-000169	Tyler	Jackson	1545 Woodz Road NE	Tucson	AZ	SouthWes	tgjackson@nonprofit.org	no
AMLA-00115	Amalina	Lara	1396 Lake Avenue SW	San Diego	CA	West	amlara@lastname.com	yes
DEPA-000852	Deven	Pal	1508 Forest Place SW	Vallejo	CA	West	depal@friends.net	no
KAKU-000848	Kanan	Kumari	1600 Fern Street S	Los Angeles	CA	West	kakumari@yahoo.com	yes
SAN-001337	Sascha	Nikolaev	1612 Apricot Road SW	San Francisco	CA	West	sanikolaev@community.org	yes
TAKO-000601	Takeshi	Kovacs	1320 River Drive S	Ontario	CA	West	takovacs@easteregg.net	no
CHTH-001194	Chiana	Thunderhawk	1288 Fern Avenue S	Arvada	CO	Mountain	chthunderhawk@yahoo.com	no
ROMC-000361	Riovan	McShane	1248 Lakeside Drive S	Pueblo	CO	Mountain	romcshane@yahoo.com	no
AYOM-001499	Ayana	Omari	568 Cerezo Drive S, No 125	Manchester	CT	East	ayomari@fun.org	no
MIUC-000986	Minoru	Uchigama	480 Dogwood Road S, Unit 229	Dover	DE	East	miuchigama@msn.com	yes
TATH-001199	Tammara	Thunderhawk	1623 Calmint Lane N	Tamarac	FL	SouthEast	tathunderhawk@yahoo.com	no
LAPE-000062	Laquinta	Pearson	1469 Beech Road E	Savannah	GA	SouthEast	lapearson@yahoo.com	no
EMSA-00121	Emeli	Santiago	780 Lacus Vag SW	Nampa	ID	Mountain	emsantiago@gmail.com	yes
SISA-001471	Sierra	Sanz	264 Tonteel Drive S, Flat 109	Garg	IN	MidVest	sisanz@skynet.com	yes
AMKA-000866	Amar	Kaur	206 Sagl Road NV, No 320	Saint Louis	MO	MidVest	amkaur@vocation.edu	yes
EMJA-000494	Ember	Jackson	1253 Autumn Blvd E	Thomasville	NC	South	emjackson@agency.gov	no
DEHO-000270	Derek	Howard	585 Sureau Lane NE, Unit 222	Niagara Falls	NY	East	dehoward@smallbiz.biz	no
NAKA-001044	Nari	Kang	629 Nebo Vag E	New York City	NY	East	nak.ang@vocation.edu	yes
RAGA-00144	Rafael	Garcia	645 Haean Blvd E	New York City	NY	East	ragarcia@friendz.net	no
KAEB-000430	Kayden	Bishara	506 Senecio Place NV, No 25	Springfield	OH	MidVest	kabishara@skynet.com	no
QUHA-000118	Quadree	Hall	729 Ferzken Lane NE	Toledo	OH	MidVest	quhall@yahoo.com	no
LUBE-000715	Luc	Bertrand	394 Navegar Avenue NV, No 105	Tulsa	OK	SouthVes	lubertrand@vocation.edu	yes

Taste du Monde — Visit Our Website!

Table Title

CustID	CustFNam	CustLName	Street	City	State	Region	EmailAdd	Opt-In
AMLA-001115	Amalina	Lara	1396 Lake Avenue SW	San Diego	CA	West	amlara@lastname.com	yes
DEPA-000852	Deven	Pal	1508 Forest Place SW	Vallejo	CA	West	depall@friends.net	no
KAKU-000848	Kanan	Kumari	1600 Fern Street S	Los Angeles	CA	West	kakumari@yahoo.com	yes
SAN-001337	Sascha	Nikolaev	1612 Apricot Road SW	San Francisco	CA	West	sanikolaev@community.org	yes
TAKO-000601	Takeshi	Kovacs	1320 River Drive S	Ontario	CA	West	takovacs@easteregg.net	no

MedAttrib: author-generated. MS Excel unfiltered and filtered dataset.

Chapter 8: Data imports

- Basic Data Sources
- Import Preparation
- Import From Database
- Import From CSV file

Basic Data Sources

Data analysis is the practice of cleaning, transforming, and analyzing raw data to acquire usable information so businesses can make informed decisions. Analysis can be performed with summary tables, charts, graphs, and other reporting tools. Data comes from many sources, including databases, surveys, quantitative research, human entry, collected, software use, etc. For years, data has

been acquired and fed into databases, with more automated means directly capturing and pushing data into huge datasets. Pulling that raw data to that it can be used is part of what Excel can do.

Excel (PC & Mac), using PowerQuery, can grab data from huge databases, as well as basic imports from simpler databases and files. For bigger database work – like mySQL, web databases, Azure, JSON, and others, you may need connectors, components, and drivers (like ODBC) before Excel can identify and connect with the database you want to import tables from – and that is more the purview of working with databases and with the more advanced Excel PowerQuery, which this book does not cover. Since that can get fairly advanced, this chapter will focus on a couple of basics: comma-separated-values .csv file, and Access database .accdb.

With the rapid deployment of AI tools, especially Microsoft's CoPilot, you will find that more intermediate-to-advanced Excel trainings will focus more on those tools. The point here, for this class, is that we will not be

dealing with AI tools bit rather the basics. Also. Microsoft has been making changes in Excel's **Data** Ribbon.
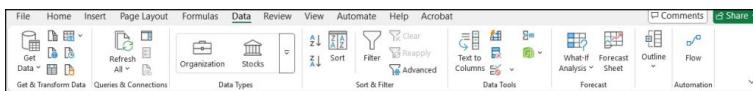
MedAttrib: author-generated. MS Excel Data ribbon.

Note: Unfortunately, *MAC users cannot import data from an Access database because Microsoft does not have that capability programmed for the Mac OS. If you are working on a MAC for your class or at home, you won't be able to do the Access DB activity.*

Import Preparation

Now, we are going to grab some data from a non-Excel source instead of inputting it ourselves. This data will be from a small company, called Prisvard Tech. which has a focus on computing technology products. To offer a taste of Excel's import capabilities, we will import some data from an Access

database. Then we will do an import from a Comma Separated Values (CSV) file.

ACTION: Try Me activity

Let's now work with an Excel file: **Ch8–Import.xlsx**. This is a dataset from Prisvard Tech, and it has almost no information in it. That's because we are going to import the information from other files.

Worksheets 1-3 with imported data

MedAttrib: author-generated. Chapter 8 Activity after imported data.

Save a copy of **Ch8–Import.xlsx** to your Examples folder. BEFORE you open it for work, you should also use your File Management utility to also grab a couple of other files from your DataFiles folder, and copy/paste these copies into your Examples folder. These two files are:

- **Prisvard.accdb** (an MS Access database, **not** for MAC users)
- **Ch8-Import.csv** (a comma-separated-values, for any user)

Then, open the Excel file **Ch8–Import.xlsx** for work. It currently includes a merged and centered Title Row with the name Prisvard Tech in it. It has a second pale yellow merged and centered row, which we will deal with a little later. Finally, it has one sheet named Sheet1. Let's set this file up for our work. Your planned starting place for importing the data will be the already yellow-colored cell **A6**.

We will attempt to import customer data into

the first, currently existing sheet. We will then import more data into a second sheet, referring to sales reps by region. Finally, we will import data into a third worksheet which refers to some products and categories. However, in order to have somewhere TO import, we need to make and name more worksheets, and for efficiency, we want the sheets to have the same format at the Customers' sheet.

- Double-click the name tab of the first sheet and rename it **Customers**.
- Right-click on the sheet's tab, and from the context panel, select **Move or Copy**.
- Put a checkmark in the box for **Create a Copy**.
- In the "Before Sheet" field, click **(move to end)**.
- Click OK. You should now see a second sheet, named Customers (2).
- Then, follow the same process as above from the Customers sheet to make *another* copy of the sheet and copy it to the end so that you have a third sheet.
- The third sheet tab will read Customers (3).
- Rename the second sheet to **SalesReps**.

- Rename the third sheet to **Products**.

Let's make the sheets stand out more by assigning a color to the worksheet tabs.

- Go back to the Customers worksheet tab, and right-click, then choose Tab color. In the offered palette, choose a **medium orange**.
- On the SalesReps tab, right-click, then choose Tab color, and choose a **medium yellow**.
- On the Products tab, right-click, then choose Tab color, and choose a **medium blue**.

We'll finish prepping these worksheets for incoming data.

- In the Customers sheet, in cell **A2**, type **Customer List**. The cell is already merged and centered from cells A2 – I2.
- In the SalesReps sheet, in cell **A2**, type **SalesReps by Region**.
- In the Products sheet, in cell **A2,** type **Product Categories**.
- **SAVE your work as you go**: Keybind is

CTRL S / Mac CMD S.

Import from Database

Now, we are going to grab some data from another source. It is also from Prisvard Tech. What we will do is a little importing of data from an Access database.

We are going to bring in a dataset from a database prepared in Microsoft Access. The file name is **Prisvard.accdb** and has a bunch of tables in it. We won't need to have MS Access to actually open and work with, although in a job you would likely be able to work and get inside the database. Here we are simply going to pull data from the database and populate the **Ch8–Import.xlsx** Excel workbook with it.

- In the **Ch8–Import.xlsx** Excel file, go into the Customers worksheet, and click into **Cell A6** (which has a medium yellow color in it). It is good to know where you would like your imported data to go.
- Look on the Data tab ribbon for the **Get &**

Transform Data group.

- In the group, choose **Get Data** to see a dropdown menu of choices.
- Choose From Database, and then choose From Microsoft Access Database.
- Excel will open an **Import Data window**, which is essentially the same as the one we use when looking for a file. That is what we will do: look for the **Prisvard.accdb** file, which should already be in your Examples folder.
- Select the **Prisvard.accdb** file, and click **Import**.
- On a Windows OS PC, Excel will "connect" with the database, and open a Navigator panel so that you can see the various items in the database. This database has only tables in it.
- We want to import information from only the **tbl_Customers table**. Select that one.
- The Navigator will then open a preview of the selected database table's contents on its right-hand side.

MedAttrib: author-generated. MS Excel data importing Navigator with preview.

- Click the **Load button**.
- The Navigator panel for the database will disappear, and *a new worksheet* will have appeared in your **Ch8-Import.xlsx file**. Interestingly, the data will not have loaded into an existing worksheet where you clicked cell A6, <u>but instead imported by creating a new worksheet</u>.
- The default for Excel is for the use of default Query Load settings, which includes importing into a new worksheet. The default is also for Excel to detect

column types and headers, which Excel loads as a table object rather than a plain dataset.

· In addition, the data that loaded will have imported as an already created Excel Table. We won't be modifying this table here, but in Chapter 9. However, we can combine the table with the Customers worksheet. It is a bit of a pain, but keeping information collected and organized will help us later. ALSO, alongside the imported table, Excel will have opened a Queries & Connections panel, *which we will ignore for now*.

· In the new worksheet with the imported table, select all the cells in the table: **cells A1-L251**. Cut them, then move to the Customers sheet and place your cursor in **cell A6**.

· In the Customers worksheet's yellow-colored cell **A6,** paste the table.

· **Delete** the now mostly empty tbl_Customers worksheet that *was* the imported info.

· **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Let's get one more practice at importing from **Access**.

- In the **Ch8–Import.xlsx** Excel file, go into the SalesReps worksheet, and click into cell **A6** (which has a medium yellow color in it).
- Again, look on the Data tab ribbon for the **Get & Transform Data group**.
- In the group, choose **Get Data** to see the **dropdown menu** of choices.
- Choose From Database, and then choose From Microsoft Access Database to get **the Import Data window**.
- Double-click the **Prisvard.accdb** file, which should already be in your Examples folder, which will bring up the Navigator again.
- In the Navigator, click once on **the tbl_Reps** in the list, which will preview a small table. Click **Load**, which will load the small table into another new Excel worksheet in our **Ch8–Import.xlsx** Excel file. Alongside the imported table, Excel will have again opened a Queries & Connections panel.

MedAttrib: author-generated. MS Excel data importing Navigator with tbl_Reps preview.

Before we clean up and get the newly imported table into the proper worksheet, let's review the connections. Alongside the imported table, Excel will have opened a **Queries & Connections panel**, *which we will now deal with.*

MedAttrib: author-generated. MS Excel Queries & Connections panel.

This **Queries & Connections panel** is a tool to let us know that there are linked connections in this workbook from another source. In this panel, we should see two items listed: tbl_Customers with 250 rows loaded, and tbl_Reps with 11 rows loaded. **Note**: In earlier versions, we would also see a second copy of tbl_Customers that represented the table/ sheet we already deleted, but this should not show up now.

Both of the tables are linked to the database we imported them from. The information can be refreshed if changes are made to the database. We are not going to do that. At this time, we have to accept the existence of these links to an external file, which we can choose to ignore by later closing the Queries & Connections panel.

First, though, let's discover if we can easily break the link. We can do this as we also cut and copy the tbl_Reps from its newly created

worksheet into a position on our pre-formatted SalesReps worksheet.

- First, in the still-opened **Queries & Connections** panel, right-click the tbl_Reps in the list. In the dropdown menu, we do not see an option to break the link to the original database that the table was imported from. That is unfortunate, and seems kind of inefficient. Hmm. . .
- Second, let's click on the *actual table* of sales reps in the **tbl_Reps worksheet**. When you click on it, the table behaves like other Excel inserted items – the activated table opens a contextual **Table Design tab ribbon**.
- In the Table Design ribbon, look at the External Table Data group. There is an available (not grayed out) button of a broken link named **Unlink**. Click on it.
- At the **Warning** that opens, stating "This will permanently remove the query definition from the sheet. Continue?," click OK.
- This *unlinks the table data from the*

database, so that even if the database is updated, this table will not be affected. This IS what we want,

- Close the Queries & Connections panel.
- Finally, in the tbl_Reps worksheet, cut the cells **A1-C12**, then paste them in the **SalesReps** worksheet in cell **A6** (colored medium yellow).
- Then, *delete* the worksheet named tbl_Reps.
- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Import from CSV file

Now, we are going to grab some data from another source. This is more Prisvard Tech info, saved into a raw format called comma separated values (CSV). This is like a text file, with no formatting except commas between "fields" of data like: *LJ,Bothell,lbothell@shoreline.edu,Instructor,happy*

- In the **Ch8–Import.xlsx** Excel file, go into

the Products worksheet, and click into **Cell A6** (which has a medium yellow color in it).

- Again, look on the Data tab ribbon for the **Get & Transform Data group**.
- In the group, <u>this time</u> choose the **From Text/CSV button**.
- The Import Data window will open so that you can look for the **Ch8-Import.csv** file in your Examples folder.
- Click the file name, then click Import.
- In the resulting pop=up window, we can see a 3 column table that Excel has interpreted based on a comma delineator.
- Click Load, and again, we'll get a table imported in <u>its own worksheet</u>, named **CH8-Import.**
- The Queries & Connections window opens again, listing this new import.

Before Import when *still* a .csv file:
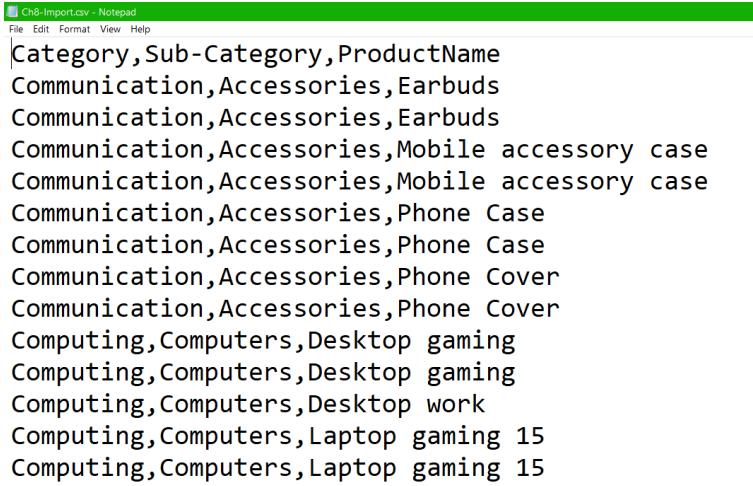
```
Ch8-Import.csv - Notepad
File  Edit  Format  View  Help
Category,Sub-Category,ProductName
Communication,Accessories,Earbuds
Communication,Accessories,Earbuds
Communication,Accessories,Mobile accessory case
Communication,Accessories,Mobile accessory case
Communication,Accessories,Phone Case
Communication,Accessories,Phone Case
Communication,Accessories,Phone Cover
Communication,Accessories,Phone Cover
Computing,Computers,Desktop gaming
Computing,Computers,Desktop gaming
Computing,Computers,Desktop work
Computing,Computers,Laptop gaming 15
Computing,Computers,Laptop gaming 15
```

MedAttrib: author-generated. MS Excel CSV in raw format.

When using Excel Import of the .csv file:

**MedAttrib**: author-generated. MS Excel CSV import panel.

Given that we need to get this new table into the existing Products worksheet, let's find out if we can break the link to the source in another way.

- In the **CH8-Import** worksheet, look at the imported table. Unlike the Access database imports, this table did not come in with a column of numbers before the first column of actual data. Second, notice that the header row reads only Column1,

Column2, and Column3, even though the row below it does read column head names. We'll have to fix those things later.

· Click anywhere in the table, and go to the Table Design ribbon's External Table Data group. Click on the button of a broken link named **Unlink**, then click OK at the warning to unlink the table data from the database.

· In the **CH8-Import** worksheet, <u>**COPY**</u> the cells **A1-C52,** including the row reading Column1. Column2, etc.

· Right-click in the **Products** worksheet Cell A6 (colored medium yellow).

· On the dropdown menu, look at the Paste Options, and select **Values**. The data from the **CH8-Import** table will paste in without any Excel table format. *Note: this Paste Values, which eliminates formatting, can not be done while the **CH8-Import** table was still actively linked to the CSV file.*

· Once you paste in the values, then delete the **row 6** that reads Column1. Column2, etc.

· Delete the **CH8-Import** worksheet that came from the CSV import.

- Close the Queries & Connections panel.
- **Save and <u>close</u>** your Excel file. We are done with it.

MedAttrib: author-generated. MS Excel CSV imported content after Paste Values.

Chapter 9: Table Creation

- Table Properties
- Table Design
- Table Object Creation
- Entering and Deleting Data
- Total Row

In Chapter 8, we got a taste of MS Excel tables when data imported from an Access Database and from a CSV file imported in the Excel table format. In this chapter, we will work on the result from Chapter 8. We previously worked with datasets, then discovered how simple sorts and filters needed extra attention to avoid corrupting the data.

However, Excel tables behave independently from the rest of the information on a worksheet. There are several advantages of

Excel treating the data independently. For example, using integrated filters and sort functions you can effortlessly drill down data based on questions and in return get results. Excel will also automatically expand the table to accommodate new data entries and allows for automatic formatting, such as recoloring of banded rows or columns.

You will also notice Excel treats formulas and calculations differently in a table, showing structured column names, along with automatically filling a calculated field to the entire table or offering quick and easy table totaling tools. This is where naming your data range – in this case a table object – is efficient.

When graphing and charting table data we will also see Excel automatically adjusts off associated charts and ranges based on what the user is sorting or filtering at the time.

Table Properties

Turning a range of cells into an Excel table

makes related data easier to analyze, visualize, and report. Structuring and planning table layouts are vital for data integrity. Below are guidelines to consider when designing and building a table from scratch. Your goal should be relating similar data so that summarizing and reporting out with graphs/charts makes sense. Table data should be easy to read. Tables that are expected to be bigger than the maximum column and row numbers for Excel should instead be stored in a database, then imported into Excel for calculations and analysis work.

Size & Location	• One table per worksheet • Separate tables from other content with a blank row. • **Table Max:** 16,384 columns and 1,048,576 rows
Field Names	• First row is column headings- header row • Format header row differently, such as bold • .Column heading max: 32,767 char.
Contents	• Data should be relational and similar. • Data entry should use standardized wording. • Format table data for readability while using consistent size and type.

MedAttrib: author-generated. MS Excel Tables info.

Table Design

Let's open the file **Ch9-Tables.xlsx** from the Datafiles folder. This is *mostly* the same result we had when we finished Chapter 8, but I deleted a bunch of customer rows to keep our work simple and streamlined. The Page Layout theme should already be the **Office theme**, which will give us the colors to use in this activity.

Here is what we are going to accomplish.

MedAttrib: author-generated. MS Excel finished Prisvard Tech customers table.

In the **Ch9-Tables.xlsx** file, we have three worksheets: Customers (orange tab), SalesReps (yellow tab) and Products (blue tab). The Customers and SalesReps sheets have an Excel

table that was created when we imported data from an MS Access database. The Products sheet has a dataset that was imported from a CSV file then modified.

- Let's work with the Customers table first. The Customers worksheet has blues, black, and yellows in the title and subtitle rows of the sheet. The table you imported may have appeared in any color in your Excel themes color palette. Mine came in as a table of green coloring. That sure doesn't go with the Prisvard Tech theme of medium blues, yellow, black text, etc.
- Click anywhere in the **Customers** table.
- When you activate a table, a contextual Table Design tab ribbon opens near the top right of your Excel UI. Click on that tab.
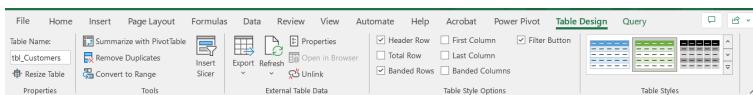
MedAttrib: author-generated. MS Excel Table Design ribbon.

The ribbon has several groups:

- **Properties**: Allows for naming and table resizing.
- **Tools**: Contains some table analysis tools.
- **External Table Data**: For use with linked live data sources, like a database that may have changes happen to it.
- **Table Style Options**: Basic table parts designation items.
- **Table Styles**: Color and layout styles for tables based on the Excel theme, color palette, and font palette you choose.
- For our purposes, we will use the groups of Properties, Table Style Options, and Table Styles.

Name a table

First, let's name the table so that if it is ever used in a calculation, Excel can identify it more easily. Then we'll change the table's color design, then add a little more detail.

- With the table selected and active, look at the Table Design ribbon's Properties group. The Table Name reads

tbl_Customers. Let's make this easier to use by overtyping with **PTcustomers**. This refers to Prisvard Tech customers.

Change Table Design

Next, let's change the color scheme of the table to be an orange base to coordinate with the worksheet's orange name tab.

- In the **Table Styles**, click the double-down arrow for a dropdown panel of table color options. In review, we should be using the default Office design theme for our color palette and font selections.
- In the Table Styles dropdown, choose the **Orange, Table Style Medium, 17**. This will change the table to a combination of a medium orange header row and light gray banded rows.

Let's explore the table tools now. Notice the specific checkboxes to turn on table options, for example, you can choose to display banded rows or banded columns, or a total row etc.

Currently, the Header Row, Banded Rows, and Filter Button selections are all turned on.

- Click on the table, and make sure the **Table Design ribbon** is active. Uncheck all three checkboxes that have a check, and look at what happens to the table.
- We clearly have a plain table without much visual definition, and no sorting or filtering capabilities. The Filter checkbox is grayed-out; the Excel table requires a header row to sort and filter information. Click to add a checkmark to the **Header row** checkbox.
- The Header row shows up again as orange, and the Filter button is also by default turned back on.
- Click the checkbox by **First Column**. Excel adds an orange fill to the whole of the table in Column A. Ugh. That is too hard on the eyes; uncheck that First Column checkbox.
- For visual definition, click the **Banded Rows** to add the gray bands again.
- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Delete Table Columns

Before we move into the second worksheet for SalesReps, let's do a little content cleanup of this Customer table. Part of this will include deleting a column or two and some other maintenance.

- Click in cell **A10**. Then click on the Home Tab, and look for the Cells group. In this group, click the **Delete dropdown arrow**, and from the list, choose **Delete Table Columns**. The ID column disappears.
- Let's do the same for the Zip column in **column G**. Click anywhere in the Zip column in the table, then repeat the Home Tab, Cells group, Delete dropdown, **Delete Tables Columns**. the G column zip codes should disappear.

Fix Merge and Center conflict

Now, we have fewer columns, but the title and subtitle row of the worksheet are still shorter

than the width of the table by one column. Let's fix this. First, clink into cell **A1**, which is actually merged and centered across columns A – I.

- After clicking cell **A1** which selects the merged cells, hold down the shift key and also click cell **J1**.
- Then, with seemingly all of **A1-J1** selected, go to the Home ribbon's Alignment group, and click the Merge and Center button once, then again.
- The first click will unmerge and uncenter Cells A1-I1, and the second click will merge and center all of Cells A1-**J1.**
- Repeat this task with row two to unmerge/uncenter cells A2-I2, and then merge and center cells **A2-J2**.

Tidy-up table data

- In Column H, which now has the Phone column, right-click on **Cell H7**. Choose Format Cells from the dropdown, and in the Format Cells panel's Number tab,

choose **Special**. In Special, select **Phone Number**, then click OK.

- Use the Home ribbon's Clipboard group **Format Painter** to apply the style of cell H8 down through cell H101.
- Auto-resize the Column H phone numbers (or manually resize to about **12.5**.)
- Auto-resize the Column I emails (or manually resize to about **24**.)

Let's sort the table so that we can modify a few of the email addresses to be hyperlinked.

- Click the Filter arrow in the Opt-In **column J**. Sort A-Z. This will sort by No and Yes responses.
- Select cell **J7**, and use Conditional Formatting for Highlight Cell Rules. The rule should be for equal to **yes** with the **Yellow fill with dark yellow text.**
- Then, use the format painter to paint that style over cells **J8-J101**. The last handful of responses – yes – will stand out.

These Yes opt-in responses need the email addresses in the column to their left to be

hyperlinked. This is a manual task, but it is one worth practicing.

- Right-click on cell **I87** which, assuming you sorted Column J so that the cells are at the top and Yes cells are at the bottom, should have the email **lolombardo@lastname.com**.
- Scroll down the menu from your Right-Click until you see **Link**, then click that. You should get an **Insert Hyperlink dialog box**.
- In Link To, select **Existing File or Web Page**.
- In the **Text to Display**, copy the contents, which should read *lolombardo@lastname.com*. Then, paste this email name to the **Address field**. Excel will automatically add a mailto: prefix to the pasted email address.
- Click **OK**. This will give you an active hyperlink.
- You can practice this a time or two, but the real answer to a situation with more than one or two links is to instead use a hyperlinking formula, which a more complex step for another chapter.

- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

ACTION: Quick Task

Let's do a quick refresher of changing the Table Design with the second worksheet for SalesReps.

MedAttrib: author-generated. MS Excel Prisvard Tech salesreps table.

- In the SalesReps worksheet, click in the table of Regions / SalesReps.
- Go to the contextual Table Design tab, and use the Table Styles group to change the table design to **Gold, Table Style Medium, 19**. This gives us a gold bar header row that goes with the worksheet name tab's yellow color. This one also has the gray banded rows in it.

- In the Table Design tab's Properties group, overwrite tbl_SalesReps with **PTregions**.
- Right-click somewhere in the table's A column. In the dropdown menu, choose Delete, then **Table Columns**. This should leave you with two columns.
- Auto-size the width of the two columns, which means that the content should not look cut off.
- Sort the **Region column** in order of A-Z using the table's header row filter button.
- Use the header row filter button for the **SalesReps column** to filter with a text filter. Click the button, and in the dropdown, choose Text Filters, and in the flyout options, choose **Begins With**.
- In the Begins With field, type **R** then click OK.
- Now you can observe that the table shows only four sales rep names in alphabetical order of their regions.
- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Table Creation
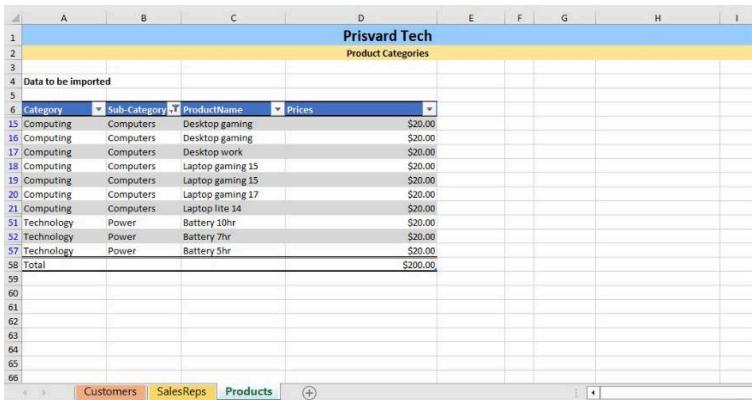
	A	B	C	D	E	F	G	H	I
1				**Prisvard Tech**					
2				Product Categories					
3									
4	Data to be imported								
5									
6	Category	Sub-Category	ProductName	Prices					
15	Computing	Computers	Desktop gaming	$20.00					
16	Computing	Computers	Desktop gaming	$20.00					
17	Computing	Computers	Desktop work	$20.00					
18	Computing	Computers	Laptop gaming 15	$20.00					
19	Computing	Computers	Laptop gaming 15	$20.00					
20	Computing	Computers	Laptop gaming 17	$20.00					
21	Computing	Computers	Laptop lite 14	$20.00					
51	Technology	Power	Battery 10hr	$20.00					
52	Technology	Power	Battery 7hr	$20.00					
57	Technology	Power	Battery 5hr	$20.00					
58	Total			$200.00					

Customers   SalesReps   **Products**   ⊕

MedAttrib: author-generated. MS Excel Prisvard Tech products table.

In the **Ch9-Tables.xlsx** file, the third worksheet has a plain dataset. We need to convert this into an Excel table object – like those in the first two worksheets. Then we need to style it so that it follows the conventions of the rest of the workbook.

Click the Products worksheet tab which is the worksheet with the dataset. What do we see?

Right now, we see a dataset with a row that reads Column1, Column2, and Column3. The row below this reads Category, Sub-Category,

and ProductName. If this data is going to make sense for later analysis, then row 6 needs to be deleted since Column1, 2, 3, etc. are not useful header names.

What we will be doing is converting the data range to an Excel Table object.

- Delete Row 6. Now, let's make a table!
- Select the data in **cells A6 – C56**.
- With this range of data selected, go to the **Insert ribbon, Tables group**.
- In the Tables group, click the **Table icon**.
- A Create Table dialog box should open, *which should already have entered the data range of cells you selected* into the 'Where is the data for your table?' field. This should read: **$A$6:$C$56**
- **Click the checkbox** next to My table has headers, then click **OK**.

The data range will now be encased in an Excel table. Now, let's name the table, then change the table design.

- Click in the table, and then go to the **Table Design ribbon**. In it, overwrite the name

Table1 with **PTproducts**.

· With the Design ribbon still active, use the Table Styles group to choose **Blue Table Style Medium 16**. This one has the gray banded rows in it.

· Adjust the width of the three table columns so that the content doesn't overflow.

· SAVE your work.

Entering & Deleting Records

Tables require constant updating and may need calculations. When your table needs updating you can add/delete data, by adding/ deleting rows, or columns. Excel adjusts the table automatically to the new content if you add it to a row or column after an existing one. The format applied to the banded rows updates to accommodate the new data set size.

When calculations are needed you can create a calculated column or use the built-in Total Row tool. Excel tables are a fantastic tool for

entering formulas efficiently in a calculated column. Excel allows you to enter a single formula in one cell, and then that formula will automatically expand to the rest of the column by itself. There's no need to use the Fill or Copy commands. This feature can be incredibly time-saving, especially if you have a lot of rows. And the same thing happens when you change a formula; the change will also expand to the rest of the calculated column.

For now, we'll just add a little data.

In the **Ch9-Tables.xlsx** file, we'll work more on the 3rd worksheet: **Products**. Currently, the table ends at row 56.

- Click into Cell A57, and type the word **Technology**, then click your keyboard's Tab button.
- In the next cell, type **Power**, then click Tab again.
- In the third cell, type **Battery 5hr** then hit Enter. The table should have automatically expanded its format and range down to accommodate the new row of text you entered.

TIP: Adding Rows. It can be tempting to insert blank rows further up in a table and add data, yet with the ease of sorting and filtering, that isn't really an efficient way of adding data.

Next, let's add a column. We'll want to add some pricing information for the Products. We'll just do the simple thing and add a repeating default price so that we can move quickly.

- Click in cell **D6**, which is to the right of the 3rd header column title.
- Type **Prices** then click your Enter key. Whoa! Excel just added a whole column of formatted space to our table. Cool.
- In cell **D7**, type **20**, then press Enter.
- Click on cell **D7**, then use the Home ribbon Numbers group, and choose **Currency**. The Cell should show $20.00.
- Copy the contents of Cell D7, and paste the data into cells **D8 – D57**.

Why did we do this? We want to add a total row to the table using the Table Design tab options. A total row needs something to total.

Total Row

A useful table tool for quick data analysis is the Total Row. You can quickly total data in an Excel table by enabling the Total Row option, and then use one of several built-in functions provided in a drop-down list, per column. The Total row, which is added to the end of the table after the last data record, can calculate summary statistics, including the average, sum, minimum, and maximum of select fields within the table.

The Total row is formatted with values displayed in bold, the double border line option is separating the data records from the Total row.
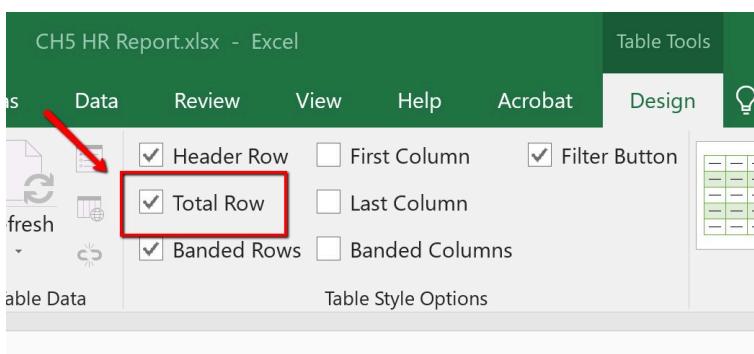
MedAttrib: Beginning to Intermediate Excel. MS Excel total row.

- Click anywhere in the Products table, then choose the **Table Design ribbon**.
- In the Table Design, click the **Total Row checkbox** in the Table Style Options group. This will add a table Total Row.
- Excel redirects you to the bottom of the table to view the total row, where a SUM was just calculated by default in the Prices column.

Before we close this activity, let's filter the Products table for only computers and power products.

- Click anywhere in the **Products** table.
- Filter the **Sub-Category** column with the Filter button by opening the dropdown filter options.
- In the options, uncheck the box for Select All.
- Then check the checkboxes for <u>only</u> **Computer** and **Power**. The table will then "collapse" rows to show <u>only</u> the Computer

and Power sub-category products, and the total for only those products.

· **SAVE your work**, then close the file. We're done!

Chapter 10: Table Management

- Freeze Panes
- Basic Sorts
- Custom Sorts
- Custom List Sorts
- Basic Filters
- Criteria Filters
- Slicers

ACTION: Try Me activity

In this chapter, we'll work with a mid-sized table from Taste du Monde again. Make sure you make a copy of the **Ch10-TableMgmt.xlsx** file from your DataFiles folder and save it into your Examples folder.

This is our goal for this work.

Taste du Monde

Region		Dessert	
East		Apfelstrudel	
Island		Baklava	
Mountain		Banana Bread	
South		Beignets	
SouthEast		Birthday cake	
West		Brownies	
SouthWest		Cheesecake	
NorthCentral		Chocolate Cake	

	Date	Fname	Lname	Address	City	State	Zip	Region	Phone	Email	Dessert	Price	Qty	Subtotal	Tax	Ta
26	11/13/20	Noah	Cohen	713 Cypress Place NE	New York	NY	10009	East	(917) 555-0920	nocohen@yahoo.com	Apfelstrudel	$6.50	1	$6.50	0.085	
32	11/29/20	Senneca	Dosela	279 Rivier Road N, Apt 124	Sioux Falls	SD	57101	East	(223) 555-1181	suivanova@easteregg.net	Brownies	$4.00	3	$12.00	0.085	
66	11/04/20	Ava	Ginsberg	958 Beech Blvd W	Seattle	WA	98115	East	(718) 555-0887	tosoderberg @gmail.com	Apfelstrudel	$6.50	1	$6.50	0.085	
80	08/30/21	Ann	Gordon	737 Sykla Way NE	Bayamon	PR	00956	East	(717) 555-1153	xoalvarez @live.com	Brownies	$4.00	1	$4.00	0.085	
105	08/21/22	Pavlo	Melnik	433 Majl Avenue NE, Apt 113	Auburn	NY	13021	East	(212) 555-0874	pamelnik @friends.net	Brownies	$4.00	3	$12.00	0.085	
131	12/05/20	Domina	Rios	541 Sequoia Drive E, Apt 129	Baltimore	MD	21201	East	(410) 555-0669	dorios @hotmail.com	Beignets	$5.00	2	$10.00	0.085	
176	11/04/20	Edward	Wright	693 Beuk Lane E	Vineland	NJ	08360	East	(856) 555-6847	edwright@gmail.com	Apfelstrudel	$6.50	2	$13.00	0.085	
181	Total															

MedAttrib: author-generated. MS Excel Slicers.

Open the **Ch10-TableMgmt.xlsx** file from your Examples folder. It has one worksheet and a table with 17 columns and 174 rows. The table has already been formatted, named, calculated, and is ready for us to practice views and sorts.

Let's look at various things we can do with tables.

Freeze Panes

We have worked a bit with simple sorts and filters, and we'll practice more detailed versions. Before that, however, let's find out a way to see some key data without quite so much scrolling. When one scrolls up and down

in a big table (and loses sight of the header row), or across more columns than can fit on a single screen view, it can be easy to get lost.

Data sets can bridge thousands of records with dozens of fields and extend beyond a workbook window. It can be difficult to compare fields and records in widely separated columns and rows. One way of dealing with this problem is by dividing the workbook window into viewing panes by using the Split view option, then freezing certain rows or columns to keep them in place no matter where we scroll.

In our specific file the data set is manageable – barely – so freezing the first column, and the top header row could be useful when scrolling through data.

Using Freeze panes, or splitting windows, does not have any effect on calculations, a total row, or how a worksheet will print out. It is only a view aid.

- Click in **Cell A5**.
- Go to the View tab ribbon, and find the

Window group.

- Click the Freeze Frames dropbox arrow, then select **Freeze** first column.
- Now, scroll to the right of the worksheet. Notice how the first column remains frozen in place while the rest of the sheet scrolls past.
- Click in **Cell A5** again.
- Go to the View ribbon's Window group, click the Freeze Frames dropbox arrow, then select **Unfreeze panes**. This clears the frozen panes view.
- Next, click the click the Freeze Frames dropbox arrow again, then select Freeze.
- Now, scroll down and see how the header row remains in place while the rows scroll up.

Now, what if we want to freeze both the header row and first column? This is a 2-frozen-pan operation, and takes a little more skill. We get to use the **Split**, then Freeze Panes options.

- Go to the View ribbon's Window group, click the Freeze Frames dropbox arrow, then select **Unfreeze panes**. This clears the

frozen panes view that froze the table's header row.

- Click anywhere in the table, then in the View ribbon's Window group, click the **Split button**. This will reveal a cross-section that seems to split the worksheet window into four panes.
- Use your cursor to grab and drag the horizontal line up until it rests just between the header row and the first data row **(between Rows 4 and 5).**
- Then, use your cursor to grab and drag the vertical line left until it rests just between the first and second columns **(between Columns A and B).**
- Next, click the click the Freeze Frames dropbox arrow, then select **Freeze**.
- Your document should allow for scrolling while leaving the f*irst column* frozen, and *the header row* also frozen.

This is efficient for very long and very wide tables.

MedAttrib: author-generated. MS Excel splitting frames before freezing them.

Basic Sorts

Sorting is one of the most common tools for data organization. By arranging data sequentially the information becomes more meaningful. Arranging records in a specific sequence is called sorting. If you sort by one column this is considered a single sort, which we worked on in Chapter 9. If you need to sort by more than one column, this is considered a custom sort. We already did a little sorting in earlier chapters, but sorting can be more complex than choosing one column and choosing A-Z.

The field or fields you select to sort are called *sort keys*. In Excel, you can easily – in one step – sort your table by ascending or descending order. Data in ascending order appears lowest to highest, earliest to most recent, or alphabetically from A to Z. Data in descending order in arranged by highest to lowest, most recent to earliest, or alphabetically from Z to A.

Excel will sort a range of data that is not in a table., which we reviewed in the chapter on data ranges. However, when working with large sets of information it is wise to make the data a table for integrity, and we have also covered. Excel locks the row of information creating a record, thus when sorted, the record remains intact, just reorganized. For example, when you sort the table by last name, all of the records in each row move together. It is always a good idea to save a copy of your worksheet before applying sorts. There are multiple places you can find and use sorting tools:

- When you first create a table, Excel automatically enables AutoFilter buttons; a tool used to sort, query, and filter the records in a table. The filter buttons appear

to the right of the column headings. When you click the filter button sorting options appear on the menu options.

Sorts and filter options can be found in two ribbons. In the Home tab, in the Editing group, you can use the 'Sort & Filter' button, and then click one of the sorting options on the Sort & Filter menu.
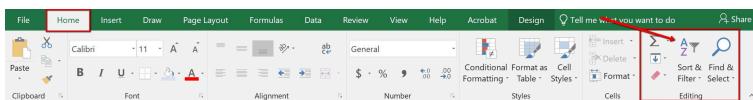
MedAttrib: Beginning to Intermediate Excel. MS Excel Sort and Filter Menu.

Also, from the Data tab, you can use the 'Sort A to Z' or 'Sort Z to A' buttons or for multiple levels select the Sort button to open the Custom Sort dialogue.

MedAttrib: Beginning to Intermediate Excel. MS Excel Data Tab Sort options.

Finally, you can right-click anywhere in a table,

and then point to Sort on the shortcut menu to display the Sort sub-menu.

Let's review with a single level sort.

- Click the Date column heading.
- Using the Home ribbon's Editing group, click the Sort & Filter button, then **A to Z.**

Notice Excel arranges in chronological order all the Dates, keeping each record together. The filter button in the header row's Date cell now displays an up arrow denoting an ascending sort.

Custom Sorts

Next, let's try a 2-criteria sort. This allows us to sort a table by two important pieces of data (2 columns). The analyst looking at the **Ch10-TableMgmt.xlsx** file wants to consider data in the Region column, then in order of a dessert for that region.

When you need to sort by more than one level, you must use the *Custom Sort option*.

- Click anywhere in the table.
- Select the Data tab, and click the **Sort** button, which will open a Sort dialog box. Notice the last column sorted by is listed. We don't want that, so we need to change the column heading name by dropping down the **Sort by** menu and selecting **Region**. Leave it at A to Z.

  - **NOTE**: For the Mac, the custom sorting is available instead in the Excel/Preferences area. You specifically need to choose your Mac's Excel button when in the Excel program, then choose Preferences, the Custom Sorts, and a window should open that allows you to add a new custom list.
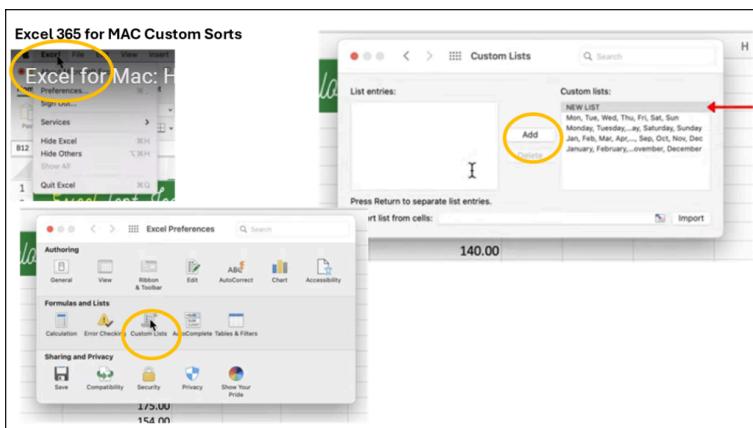
MedAttrib: Screenshots from Mike Thomas Excel for Mac YouTube video. MS Excel for MAC Custom Sort access.

- Then, while still in the sort dialog box, click **Add Level**.
    - **Mac Users:** click the + symbol.
- Click the down arrow in the **Then by** section, and choose the column heading for **Dessert**. Leave it at A to Z.
- Click **OK**.
- **SAVE your work as you go**: Keybind is CTRL S / Mac CMD S.

Now the table is sorted by Region, and within the context of each Region, sorted also by the names of desserts from A-Z.
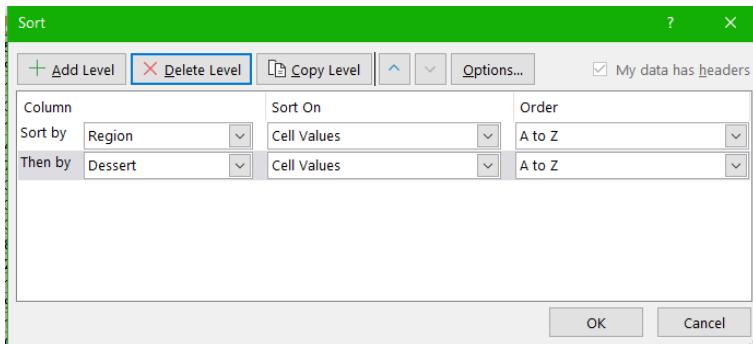
MedAttrib: author-generated. MS Excel Sort Dialogue Box 2-level.

This can be done for several sort levels, although in order to do that, an analyst needs a specific reason to sort data by more than a couple of criteria. Common combos in basic tables (not just this one) can be things like:

- Sort by region, then state
- Sort by state, then by city
- Sort by email, then opt-in
- Sort by salesrep's last name, then region
- Sort by product, then category
- Sort by sales date, then product sold

Custom List sorts

When sorting you can create custom lists that allow sorting by characteristics that do not sort alphabetically. Example, text items such as high, medium, and low – or S, M, L, XL. Dates commonly require custom lists so you can vary in the way data is sorted by days of the week or months of the year.

In our case, we want to create a custom list that sorts regions, which is not in ascending or descending order. The analyst likes to order the regions based on the part of the country and wants to focus on the West US. And, the analyst wants to see the desserts related to these, and their prices.

Follow the below steps to create a custom list ordering:

- While clicked in the table, choose the Data tab and click the **Sort** button.
- In the Sort by row, click the drop-down menu in the Order Column for the **Region** heading. Choose **Custom List**.
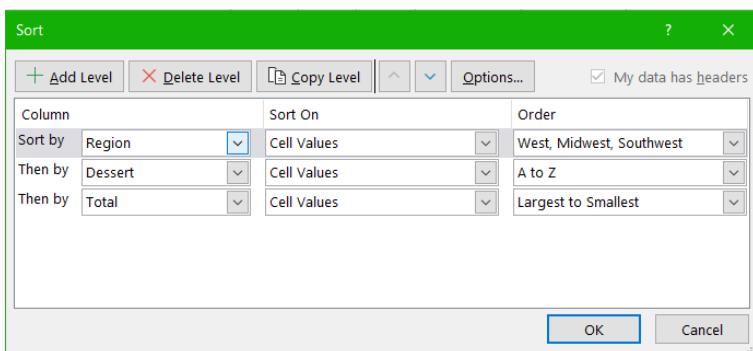
MedAttrib: author-generated. MS Excel Custom List Dialogue Box 3-level.

- Click in the **List entries:** box and type **West** and press enter. Type **Midwest**, then enter. Type **Southwest**, then press Enter. Once all locations are entered, click **Add**. Then choose **Ok**.
- The *second level sort* can remain the same, because we want to still see the yummy **desserts**.
- Add a third level sort by clicking on the second level, then clicking **Add Level**.
- For the third level, choose Total from the list so that we can see the costs of the desserts. The Order will *default* populate Smallest to Largest. Instead, **change** that to **Largest to Smallest**.
- Click **OK** to close the Sort dialogue box.
- **SAVE your work** as you go.

The custom sort is applied, and the table is now sorted by Region, using the custom order, then the dessert, and then by the Total column. The interesting thing is that we listed only three of the regions in our specific sort; the remaining regions simply sorted alphabetically after the sort list for Regions was applied. This allows us to see the three region areas as the priority of

the whole table but also includes the remainder afterward.

Basic Filters

If your worksheet contains a lot of data, it can be difficult to find information quickly. Applying Filters is an effective way to temporarily and only show the information needed. Typically when filtering you are searching the data for specific information to filter the remainder out. Generally speaking, you are searching the data based on a question, or in other words, querying the data, and returning only the information that satisfies the question. The process of filtering records based on one or more filter criteria is called a query. Filtering data hides the rows whose values do not match the search criteria – but **note** – *it does not delete the data of the hidden rows, and some actions you take may still try to affect those hidden rows, so be careful*. The information that does not display is not deleted, it is just hidden, and will be

redisplayed by removing the filter or applying a new filter.

An additional note is that when filtering rows that contain calculated numbers (such as in a total row), the calculated number will change to reflect only the calculations based on the visible rows.

Like sorting, Filter options are located in the filter button in each field name. By clicking the filter button, you can choose which values in that field to display, hiding the rows or records that do not match that value. The filter lets you choose to display only those records that meet specified criteria such as color, number, or text. In this situation, criteria is defined as; a logical rule by which data is tested and chosen. We applied a simple filter in Chapter 9 using the table header row filter buttons.

For example, you can filter the table to display a specific name or item by typing it in a Search box. The name you selected acts as the criterion for filtering the table, which results in Excel displaying only those records that match the criterion. The selected checkboxes indicate

which items will appear in the table. By default, all of the items are selected. If you deselect an item from the filter menu, it is removed from the filter criterion. Excel will not display any record that contains the unchecked item. As with the previous sort techniques, you can include more than one column when you filter by clicking a second filter button and making choices. After you filter data, you can copy, find, edit, format, chart, or print the filtered data without rearranging or moving it.

Example: if you have a table full of cities in Washington State, and you want to only see Seattle and Spokane rows, you can filter out the rest by clicking only the filter button for those two cities.

Criteria Filters

The filters created are limited to selecting records for fields matching a specific value or set of values. For more general criteria, you can use criteria filters, which are expressions involving dates and times, numeric values, and

text strings. Excel will identify what criteria filter to display based on the information in the column. For example, you can filter the employee data to show only those employees hired within a specific date range. Notice the criteria filter changes to Date Filters. If we were looking at the Current Salary column, the filter would be a Numbers Filter.

Using criteria filters, follow the steps below to search for customers who have spent a total greater than $7.00.

Identify customers by last name who spent more than $7.00 in the total column.

- While clicked in the table, clear any sort or filter applied by clicking the Data tab. In the Sort & Filter group choose the **Clear** button.
- Click the Filter button in the **Total** column. Select **Number** Filters, and choose the **Greater Than** criteria.
  - **Mac Users:** uncheck the **Select All** checkbox **before** choosing the **Between** option.
- In the "Is greater than" field, type the

number **7**, then click OK.

- Sort the filtered table from **A-Z** by LName.

Notice the filter button displays a filter symbol and an up arrow indicating the column is filtered and sorted in ascending order. Also, notice that fewer rows are showing, and that the total row shows *the total for only the displayed rows*. Let's narrow down the bigger spenders.

- Click the Filter button in the **Total** column, select **Number** Filters, and choose the **Greater Than** criteria. Type in **12**. The result reveals fewer rows, and an adjusted Total in the total row for the spending of greater than $12.00.
- **SAVE your work** as you go.
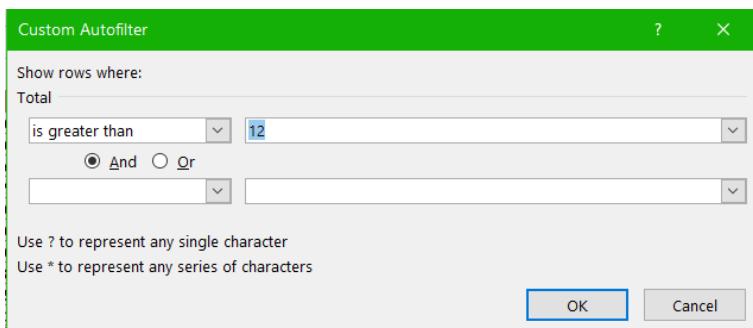
MedAttrib: author-generated. MS Excel Custom Autofilter.

Slicers

Another way to filter an Excel table is with slicers. Slicers, generally speaking, are visual filter buttons you can click to filter the table data. Slicers show the current filtered category, which makes it easy to understand what exactly is displayed. For example, a slicer for a field listing stores in several cities would have buttons for the Seattle, San Diego, Portland, and San Francisco locations.

When slicer buttons are selected, the data is filtered to show only those records that match the criteria. Multiple buttons can be selected at the same time, and a table can have multiple slicers, each linked to a different field (**column** contents). When multiple slicers are used at the same time, Excel uses the AND logical operator so filtered records must meet **all** of the criteria indicated in the slicer. When selecting multiple buttons in a Slicer, use the

shift key to select adjacent field names. If the field names are not adjacent, use the non-adjacent selection method, pressing the CTL button, and selecting the field names needed.

The cool thing about slicers, though, is that they are a more easily visible way to change filters in a table instead of having to use the normal table header row filter buttons. By looking at the activated slicers, you can see at a glance what the filtering is, and at a touch, you can quickly change the criteria.

Note: See finished chapter activities image above to see slicers.

Follow the below steps to filter the table using visual Slicer buttons.

- Click in the Taste du Monde table area. From the Data tab, choose **Clear** to remove the current sort and filter applied to the data.
- Also, let's clear the frozen view panes. Go to the View ribbon's Window group, click the Freeze Frames dropbox arrow, then select **Unfreeze panes**. This clears the

frozen panes view. Why? *Because we will be adding rows, and row 4 will no longer be the header row.*

- To make room for the **Slicer** buttons at the top of the table, we will add 7 rows between the title and the table area. Right-click cell **A3**. Choose Insert. Select **Entire Row**. Repeat these steps until the table header row starts in row **A11**.

  - **Mac Users:** should hold down **CTRL key** and click cell A3. Then repeat until the table heading starts in row **A11.**

- Click back into the table area. Choose the **Table Design** tab, and in the Tools group, click **Slicer**. When the Insert Slicers dialogue box opens, click the **Region** and **Dessert** field names to display as slicers. Click **OK**.

- Move, and re-size the two created Slicer boxes to fit in the **approximate** areas: *Region* around **G/H 1-9,** and *Desserts* around **J/K 1-9**. Make sure the buttons remain visible. Below is a visual example.

- From the **Region** slicer, click the **West** button. Notice the data filters to only show the data for the West region.

- From the **Desserts** slicer click **Birthday cake**. Notice the data filters to only show the data for Birthday cake in the West region. If there had been no matches, the table would appear empty except for the header row.
- Return to the Region slicer and clear it by clicking on the filter icon with the red x. Then choose both **NorthEast** and **East**. Note the non-adjacent selection method is needed. Select Northeast first, then press and hold the CTRL button on the keyboard, and then select **East**.

    ◦ **Mac Users**: hold down the CMD key not the CTRL key before you click on East.
- Change the Desserts slicer selection to **Apfelstrudel, Beignets,** and **Brownies,** using the same control/select as you did for the Region slicer.

The table results show there are **7** customers in the NorthEast and East regions who ordered those three desserts.

- **SAVE your work**, and close the file. We're

finished!

Part 3: Workbook Management

Excel workbooks often contain a large amount of data, and worksheets can quickly become overwhelming. When one worksheet becomes cumbersome, data can be broken out into smaller subsets and placed in separate worksheets within the same Excel file. Separating out spreadsheet data into smaller pieces can lead to better data organization within a file and increase its ease of use. When a retail company needs to track overall sales, as well as individual store sales, it makes sense to place each store's sales data in a separate sheet within a file. Adding a summary sheet that sums across all the sheets will allow for total company sales data in the same file. This chapter will show how to set up a workbook to make multi-sheet formulas quick and easy.

Other examples of when multiple sheets make the most sense are when you are comparing regional data for a salesforce and wish to

evaluate individual salesperson performance along with overall sales, and data over a period of time where sheets can be broken out by year or by month. When comparing data across several sheets, it is essential that all the sheets are laid out in the same way. To facilitate this, a template can be used. A template is the basic pattern for each new sheet that can be used repeatedly to make sure each new sheet has the same setup, formatting, formulas, etc. as the existing sheets in a file. In section, we will create examples from scratch to meet the specific needs of our work.

Chapter 11: Workbook Basics

- Adding/Deleting Worksheets
- Renaming Worksheets
- Copying Data to Another Worksheet
- Copying Worksheets
- Moving Sheets
- Grouping/Ungrouping Sheets
- Grouped Sheet Layout Settings
- Grouped Sheet Headers/Footers
- Worksheet Protection

We have already worked with a couple of Excel workbook files that included multiple worksheets. Depending on the version of Excel you are using, a new Excel workbook file may open with a default of one or several sheets.

TIP: Default sheets number. In the File Backstage Options area, under the

General tab. You can also set the default number of sheets that new files will open with.

In this chapter, we will be working with a business file that contains information for an entire year. The file contains a worksheet for each quarter of the year, as well as a Summary sheet that will add info from all four quarterly sheets of data together. To begin with, we'll get comfortable with moving through the sheets, organizing them, and making sure that all quarterly sheets are consistent.

ACTION: Try Me activity

Ihoosha Online Training is a sole proprietorship business with a freelance online trainer. The data is about students from around the US, who enrolled for online asynchronous trainings in 2022. The data contains learner contact information, enrollment information, costs per credit, and a space (uncalculated) for grades.

Here is what we are aiming for (5 worksheets sheets total):

MedAttrib: author-generated. MS Excel workbook with multiple sheets.

Their **Ch11–Workbooks.xlsx** file currently has four worksheets. The 2022 table has already been formatted, named, and manually separated into three quarterly worksheets, and is ready for us to work on. We need another quarterly worksheet, and will learn a manual method of acquiring that information. One useful thing to know: Ihoosha is focused on a

fiscal year of **January-December of 2022**, not an academic year of Fall 2021-Summer 2022. This will affect the order of things.

- Open the **Ch11–Workbooks.xlsx** file and save a copy to work on.
- Click on the different sheets at the bottom of the screen to move through the sheets. Notice also that all the quarterly sheets are identical in layout and format. Currently, 2022 is first, then Winter, Spring, and Summer.
- Fall – the last *academic* quarter that fell in 2022, has no sheet. It needs to be added.

Adding/Deleting Worksheets

Now, for practice, let's add then delete new worksheets in this same file (workbook).

- Make sure you are in the 2022 worksheet, which has the full annual table. Click anywhere.
- In the worksheet's name tab section, click the **+ button** to add another worksheet

tab, which should default name itself Sheet1. **Sheet1** *should* appear just to the right of 2022.

- Click the **+ button** to add a third worksheet tab, which should default name itself Sheet2 and appear to the right of Sheet 1.
- Click the **+ button** to add a fourth worksheet tab, which should default name itself Sheet3 and appear to the right of Sheet 2.
- We actually do not need all of these sheets. Choose **Sheet1,** so that you are in that blank sheet, then look in Home menu ribbon for the **Cell** group.
- Click the down arrow on the **Delete** button and choose the Delete Sheet option from the drop-down list. This removes the **Sheet1** worksheet.
  - Click the Delete button on the Delete warning box (if a warning box appears).
- **Alternate method:** RIGHT-click on the name tab of **Sheet2**, which will offer a contextual menu. On the menu, click Delete.
- This should still leave you with **Sheet3**.

- **SAVE your work**.

Keyboard Shortcut: Inserting New Worksheets. Press the SHIFT key + F11 key.

Renaming Worksheets

The default names for new worksheet tabs at the bottom of any workbook are Sheet1, Sheet2, and so on. However, you can change the worksheet tab names to identify the data you are using in a workbook. Additionally, using you can change the order in which the worksheet tabs appear in the workbook, and using that same process add a worksheet, delete one, protect one, etc.

The following steps explain how to rename and manage the worksheets in a workbook:

- Double-click the Sheet3 worksheet name tab at the bottom of the workbook. Type the name **Fall**.
- Press the ENTER key on your keyboard.

Now we have a nice, empty sheet named Fall. We need to add some things into it.

Copying Data to Another Worksheet

First, this sheet should look like the others. **Ihoosha** already uses a specific Theme and color palette, and has a logo icon plus the company name at the top of worksheets. We need to copy that information from another sheet to this one.

- Enter the 2022 sheet, and in cell **B1**, copy the name **Ihoosha Online Training**. Then move to the **Fall worksheet**, cell **B1**, and paste the name into it.
- Re-enter the 2022 sheet, and copy the **icon**, then move to the **Fall worksheet** and paste it. You will likely need to drag it to the Fall sheet's **A1** cell space so it resembles the placement of other sheets.

Now, we need to acquire data from the 2022

<u>sheet</u> and copy/paste it into the **Fall** sheet. Let's start with the header row of the table.

- In the 2022 sheet, select **Cells A5-Q5**, and copy them. Then move to the Fall sheet, place your cursor at cell **A5**, and paste. You should get a header row – without filter buttons – since this paste <u>did not</u> make this an Excel Table object.

We need to copy only the Fall records from the 2022 sheet to the Fall worksheet. How can we make this easier to find so we can grab the correct info?

Pre-determining info to copy

Let's do some conditional formatting in the **2022 worksheet** to help visually determine what that data is before we actually copy/paste it elsewhere. Yes, we can and will sort the information, but assuming that Ihoosha chooses to use this sheet for 2023 later on, the conditional formatting can be even more efficient over the longer term, especially if the

student base (number of rows of students) triples or more.

- Enter the **2022** sheet. Go to Cell **K6**, which is the first date in the **Enrollment Date** column. Let's add conditional formatting, which will have to be created since it may not be a default Excel offering.
- On the Home tab Styles group, click the **Conditional Formatting** dropdown.
- Choose **New Rule**.
- Choose "Format only cells that contain".
- In the Rule description, choose Format only cells with **Cell Value**.
- Make sure the second field reads **Between**, and in the third field type **October**, and type **December** in the fourth field.
- Click the Format button, which will open **the Format Cells panel**. In the panel, choose the Fill tab.
- In the fill tab, choose the **light green** from the 7th column of the palette, second light green from the top. Click OK.
- Click OK in the **Formatting Rule** panel to accept it. Click OK on the **Rule Manager** if

it is also still open, to apply the rule.

· **SAVE your work**.

Let's find out what happens. Before we can get a result for the applicable dates, we need to apply this conditional formatting down the column.

Use the Home tab Clipboard group format painter to paint the format of cell **K6** over cells **K7 – K166**.

Hmmm. . . that did not work. Why? It is likely because we looked at the value of the date cells, and Excel didn't recognize that as a value that could be interpreted as October, December, etc. *Well, mistakes are the stuff of learning*!

· Select cells **K5-K166**.
· Open the Conditional Formatting dropdown and select **Manage Rules** to open the list of Conditional Formatting rules we have. There should be only the one we just created.
· Click **Edit Rule**, which will open up our rule instructions. Instead of October, replace

that text with **10/01/22**. Instead of
December, replace that text with **12/31/22**.
Then click OK, then OK again to close the
Rules Manager and apply the rule.
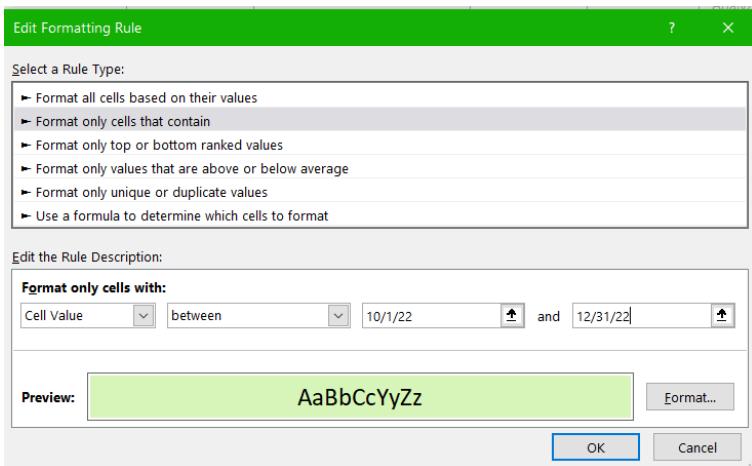
MedAttrib: author-generated. MS Excel Edit
Formatting Rule panel.

Yay! That worked. And, since we applied the
change in the rule formatting criteria to all cells
in the table's K column, the dates that met the
rule complied and now have a light green
background.

Now, let's sort!

- Use the Enrollment Date table **header's**

filter button to Sort the column from Oldest to newest. Because the Fall quarter dates are the final months of the year, this sort puts them all at the bottom of the table, bunched together.

Now that we have the 2022 worksheet's Fall months sorted together, we can easily see and choose to copy **only** the needed records and paste them into the **Fall** worksheet.

- Select only the records at the bottom of the table, with the green-background dates, which are for October-December 2022.
- Copy only the records from columns **A-Q**.
- Go to the Fall worksheet, and put your cursor at cell **A6**, then paste the information. This should paste in all the data you copied, starting at cell A6 and ending at Q66.
- Finally, we need this to be a real Excel table object, to make sorting/filtering smoother. Select cells **A5-Q66**, then use the Insert ribbon's **Table icon** to insert a table with *the header row checkbox checked*.

- Click anywhere in the new table object, then use the Table Design tab **Table Styles** to select **Turquoise Table Style Light 10.** This will format the table like those on the other sheets.
- **SAVE your work**.

Copying Worksheets

Can't we do this faster, with fewer steps? – says any student everywhere. Why yes, yes we can. Sometimes you will inherit a spreadsheet which requires more piecemeal tasks like we just finished, so that was of value to learn. However, we can also use a worksheet copy process instead of all these manual steps. Luckily, in this file, we already have done the work on the 2022 sheet with the conditional formatting for the date column, so that will help.

- First, click on the name tab of the existing **Fall** worksheet, and change the name to *TEMP-Fall*. *We don't want to lose our work until we are certain we don't need it any*

longer.

- Then, enter the 2022 sheet. Right-click on the 2022 **worksheet tab name**.
- Select **Move or Copy** from the dropdown menu.
- In the Move or Copy panel, first put a checkmark in the **Create a copy** checkbox. This is so that the 2022 sheet will be copied, not simply moved.
- The **To book** field will show the name of the current file, since we are copying/moving inside the same file.
- Then, in the Before sheet, click **(move to end)** and click the **OK** button.

A copy of the 2022 worksheet is now at the right side of all the other worksheet name tabs.

- Double-click the 2022 (2) worksheet name, and type **Fall** to overwrite it.
- Click into this "new" Fall worksheet. It is already formatted, and all we need to do is to separate out the Fall months of October, November, and December – meaning, in this case, that we need to **KEEP** those records, and eliminate the remainder.

- Review the worksheet. Currently, all the October, November, and December records should still be grouped at the bottom, which means you need to delete the other records <u>between</u> them and the header row (which is row 5).
- Select **Cells A6 through Q105**, which are the record rows we need to delete.
- In the Home ribbon Cells group, use the Delete dropdown list and select **Delete Table Rows**.
- Now, the Fall sheet doesn't need that conditional formatting. Select Cells **K6 – K66**, then in Home / Styles group / Conditional Formatting, choose **Clear Rules**, then **Clear Rules from selected cells** from the flyout sub menu. The conditional formatting for this sheet goes away.
- One more thing – **let's delete the TEMP-Fall worksheet that we don't need anymore**. Right-click on the TEMP-Fall worksheet tab name, and choose **Delete**. Accept the warning and delete it.
- **SAVE your work**.

Moving Worksheets

There are a couple of ways you can move a worksheet. We'll try both, since the annual 2002 sheet should be at the end of the workbook, and the Fall worksheet should be at the beginning.

- Right-click on the Fall worksheet's tab name. In the dropdown menu, select **Move or Copy** from the dropdown menu.
- In the Move or Copy panel, **do NOT** put a checkmark in the Create a copy checkbox. This is so that the Fall sheet will **only** be moved.
- The **To book** field will show the name of the current file, since we are moving inside the same file.
- Then, in the **Before sheet**, click 2022 (to move before that sheet) and click the **OK** button. The Fall worksheet should now be the first available worksheet tab at the left of all the worksheets.
- Press your mouse cursor down on the **2022 worksheet's name tab**, until you see a small icon of a *sheet of paper floating*

near your cursor. That is the indicator that you can, while still pressing down on the mouse cursor, drag the worksheet tab.

· Drag the 2002 worksheet tab to the right of the Summer worksheet tab, then release the mouse/cursor. The annual 2022 worksheet should now be at the end of the row of worksheet name tabs.

· **SAVE your work**.

Grouping/Ungrouping Sheets

Most of your work will usually be one sheet at a time, but there will be times when you wish you could combine some work on multiple sheets at once. For a few things, like preparing for a print job, setting up all page layouts in a workbook, or selecting only some of the sheets for protection, you can. We will want to add headers and footers to our workbook on **all** the sheets, so temporarily grouping them for this work would be effective.

However, grouping worksheets in Excel is temporary. It can be ungrouped if you click on

the name tab of one of the worksheets to navigate to the sheet to work on it. They will not ungroup if you work on the worksheet that is currently open in your workspace, but when you need to navigate away, they will ungroup. Let's try this out.

- We are still working with the **Ch11–Workbooks.xlsx** file. Click once on the Winter worksheet's name tab. Then, hold the control / command (Mac) key down, click on the Spring tab, then release the control/command key. Notice that both of those worksheet tabs change color, to indicate they are grouped.
- Click only on the 2002 name tab, and this will ungroup the other sheets.
- Now, click once on the Fall tab, then hold your shift key down and click once on the 2002 tab. This will group **all five** of the sheets.
- Click on any of the worksheet name tabs to ungroup them. *Alternate method*: right click on one of a group of name tabs, and choose Ungroup from the dropdown context menu.

Grouped Sheet Layout Settings

Let's put grouping sheets to work for us by using this while creating header and footer content that should appear on every worksheet in the workbook. In this case, we want the Logo, company name, page number, and current date to show up on every page of the workbook.

Header: A header in Excel is the top-of-the-sheet area between the top of the margins for the sheet data, and the top edge of the sheet of paper/page itself. The space allowed is designated when setting up the page layout of a document.

Footer: A header in Excel is the bottom-of-the-sheet area between the bottom of the margins for the sheet data, and the bottom edge of the sheet of paper/page itself. The space allowed is also designated when setting up the page layout of a document.

TIP: You can work on Headers and Footers through the Page Layout

ribbon's Page Layout group's Page Setup panel, OR you can work on them directly in the worksheet(s) by changing the sheet(s) view from the Normal view to the *Page Layout view.*

There are no side-of-page data fields like the header and footer.

Let's group everything first, then check our margins, page size, and page orientation. *This is covered in more detail in our chapter on Distribution*. Enter the **2022** worksheet.

- Group all the worksheets by selecting the Fall tab, holding the shift key down, then clicking in the 2022 tab. *All sheets should be grouped*.
- You can work inside the 2002 sheet because it is the "open" sheet for editing in your workspace. Click once inside the sheet (**not** on the name tab).
- Go to the Page Layout tab, and in the Page Setup group, select the Margins icon. This will open the Margins dropdown.
- Click **Custom margins**, to see what the settings are.
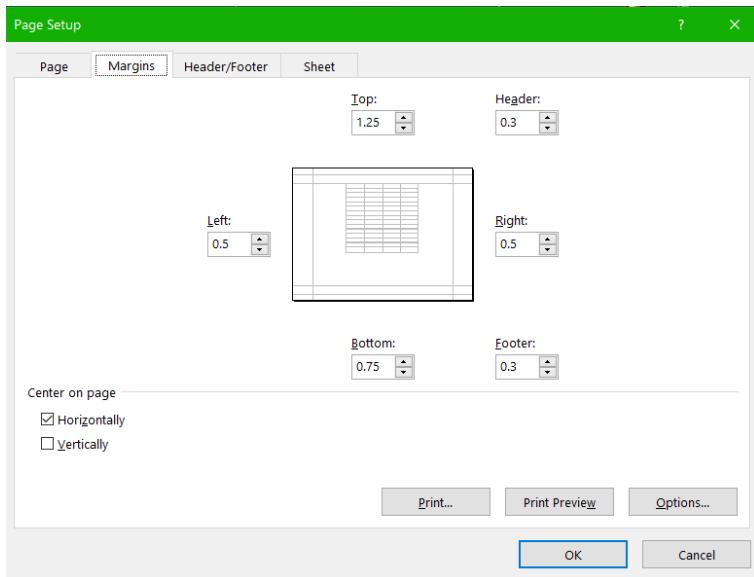
MedAttrib: author-generated. MS Excel Custom Margins.

We already have a top margin of 1.25 inches, a bottom margin of .75 inches, and side margins of .5 inches. The header and footer can be as close as .3 inches to the edge of the sheet of printed paper. Also, the content of any worksheet will be centered on the page when printed, even though in normal view we won't be able to see that. *We will keep these settings.*

- Click **Cancel** to close the panel.
- With all the worksheets still grouped, click

Orientation in the Page Setup group. It should show that Horizontal/*Landscape* is selected. *We will keep this.*

- With all the worksheets still grouped, click **Size** in the Page Setup group. It should show that **Legal (8.5 x 14)** is selected. *We will keep this.*
- Now, with all the worksheets still grouped, look in the **Page Layout** ribbon tab, Sheet options group. Click the little button at the lower right of the group that will open the **Sheet Page Setup panel**.
- In the panel, click the **Header/Footer tab**.

Grouped Sheet Headers/ Footers

Right now, the header and footer panel shows no header/footer content. Each has a dropdown arrow, which allows you to choose pre-set Excel content for either. Let's personalize the header, and use a preset for the footer. *This is covered in more detail in our chapter on Distribution*

- In the panel, choose the **Header button**, which will open a custom Header panel.
- In the Header panel, click in the **Left** section, and type **Ihoosha Online Training**.
- While still in the Left section, select all three words, then click the Format Text button, which will open the **Excel Font panel**.
- In the panel, choose Font style **Bold**, and **size 16**, then click **OK**.
- Click **OK** again to exit the custom Header panel. Note how the Page Setup panel, which is still open, now shows your header information in the Header preview.
- In the Page Setup panel, click the **dropdown arrow for the footer** for a different way to approach the footer.
- Select the option **Page 1 of ?,** then click **OK**.
- In the Page Setup panel, the footer preview will show **Page 1 of 1**.

TIP: Excel update fields. In Excel header and footer content, some items may need to update to reflect the number of a page, or the current date. Excel adds

code to do this in its date, page number, file name, and file path header/footer options. S, Page 1 of ? means that Excel will replace the ? with the proper page number when the worksheet is viewed in print or in Page Layout view.

- Click **OK** to exit the Page Setup panel.
- **Ungroup** your worksheets.
- Choose any worksheet, then choose the **Page Layout view** icon for it in the Excel status bar's view option icons. In this view, with a little scrolling, you should be able to see the header and footer information on the sheet.
- On the same worksheet, return to **Normal view**.
- **SAVE your work**.
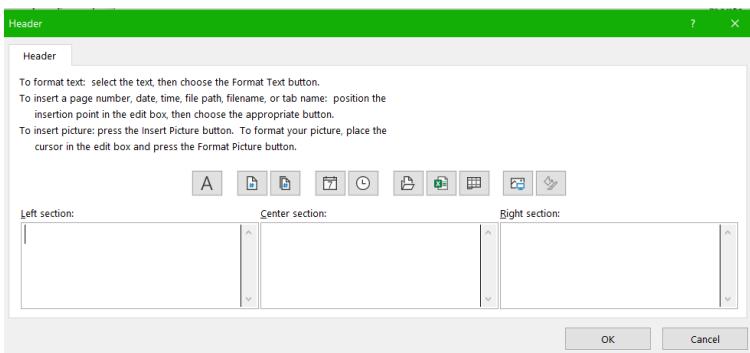
MedAttrib: author-generated. MS Excel custom header panel.
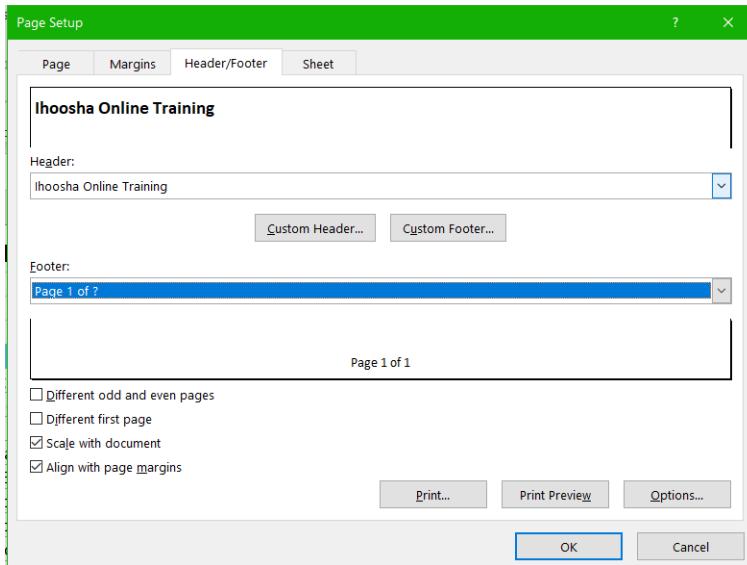
MedAttrib: author-generated. MS Excel Page Setup panel for headers/footers.

Workbook Protection

Let's do one more task. This workbook is for all of 2022, and Ihoosha just finished Fall quarter, which means some work might be added to it. The other quarters are finished, and should be

view-only, or protected from editing. Let's do that.

- You would already have ungrouped the worksheets at the end of the last task. Now, shift click on the **Winter, Spring, and Summer** worksheets to group them.
- Right-click on your newly grouped worksheet tabs, which will offer a contextual menu. Interesting – the Protect Sheet option is grayed out.
- With the sheets still grouped, let's go to the Review ribbon, Protect group, and. . . Hmmmm. The Protect Sheet is grayed out there too. The only available option is to protect the whole workbook.

In Excel for home and professional use, Excel only allows the protecting of one sheet at a time, or of a whole workbook. The Enterprise version has a multiple worksheet selection option, and there are macros that can do it, but for easy use, we're stuck with one sheet at a time.

Learning from things we can't do can be useful too.

- Ungroup the three worksheets. Then right-click on the **Winter** sheet, and choose Protect sheet.
- In the password field, type the word safe
- Don't add any checkmarks in the list of choices,. Then click OK.
- When asked to repeat the password, type the word safe in again.
- Do the same steps to the Spring and Summer sheets.
- **SAVE your work** and close the file. We are done here!

TIP: Protecting work. Whenever you protect a worksheet in Excel, it usually means no one else can edit the worksheet (or workbook, if you protect the whole file). Be sure to know your protection password so you can unlock the sheet or workbook again.

Chapter 12: Data Linking

- Data Linking Formula
- Click-Linking
- Linking Between Workbooks

An additional way to get data from one place to another is to use a Cell-linking method. This is when a workbook cell references data from another cell in a way that copies it in and **also** links it to the original cell. For instance, a master sheet may be updated, and have several other sheets dependent on it. If the original data is manually added to each worksheet, then new changes need to also be manually updated on each worksheet. Sigh.

However, if data is entered into one worksheet, and cells in one or more locations on other worksheets need that data, Cell-Linking to that

data will bring it in. And, the only place the data needs to be updated is in the original sheet that the other sheets have linked to. Change that data – such as correcting a spelling or changing a date, and that data will automatically change on the other sheets referencing that data as well. Cool, huh?

ACTION: Try Me activity

We will work with **Ihoosha Online Training** again. In this case, we will work on the **Ch12–DataLinking.xlsx** file, and we will also need to reference the **Ch12–DLSupport.xlsx** file. You should make a copy of these from your DataFiles folder and put them into your Examples folder so you can work on the copies.

Open the **Ch12–DataLinking.xlsx** file from your and look it over. There are four sheets: MarchLeads, 2023Students, GraphicsClass, and 2022Fees.

Data Linking Formula

The Data linking method is as simple as telling a cell where to get data from. Essentially, you will be telling a specific cell in Excel to look for data in another location, so that this cell populates with that same data in a way that is linked to the *other* cell the data came from.

We can do that using a simple Excel formula method. The first thing we want to do is to add the leads **from** the MarchLeads sheet (host) **to** the end of the 2023Students sheet's table (already populated).

Enter the 2023Students sheet. The dataset in here is **not** an actual Excel table object, because this can have trouble adding rows of new data into the table object structure we will be applying here. Data needs to be added, **then** we can create an Excel table object.

MarchLeads worksheet

2023Students worksheet

Data FROM the host cell

Data TO the population cell

MedAttrib: author-generated. MS Excel data-linking process.

In 2023Students, click on **Cell A66**. We need to tell that cell where to find some data. The cell is at the bottom of a column of student first names, and we want to add another first name of a student – which happens to be in the MarchLeads worksheet.

- Now, in Cell A66, type this specific formula: **=MarchLeads!A4** then press your enter button immediately. (*Do not return to the other sheet or click anywhere else until after you hit Enter.*) This should bring in the first student's First Name *from* the worksheet called **MarchLeads** cell **A4**. That name is *Hugh*.
- In cell B66, again type the linking formula, this time for the MarchLead sheet's first

student's LastName. The formula is
=MarchLeads!B4 then immediately press
enter, which populates the **2023Student**
worksheet's cell **B66** with the last name
Culber.

- In the **2023Student** worksheet's cell **C66**,
  type **=MarchLeads!C4** and immediately
  press enter.
- In **2023Student** worksheet's cell **D66,** type
  =MarchLeads!D4 and immediately press
  enter.

Now you should see one record of a new
student, which was "imported" / linked – in
from the host MarchLeads sheet to the bottom
of the already populated 2023Students sheet.
Let's make a change to see why this is useful.

**TIP: Always press Enter <u>immediately</u>
after clicking into the cell you are
getting data from, so that Excel will
flawlessly link to the specific cell you
clicked. If you do not, and instead travel
back to the worksheet in which you
started the formula, OR you accidentally
click somewhere else, the datalinking**

formula will get corrupted.

- Enter the MarchLeads worksheetsheet, and go to **Cell B4**. We have the incorrect last name, which should be Colbert. Overwrite the name Culber with **Colbert**.
- Enter the 2023Students sheet, and look at **cell B66**. The change we made in the other worksheet is also updated here: Culver changed to **Colbert**.
- **SAVE your work**.

Data Click-Linking

There is an even easier way that doesn't require you to type that little formula, and it is a little more accurate, especially when typing can bring in errors. (*Your instructor has typing butterfingers*). This allows you to let Excel grab the info from another cell in the same sheet or another sheet (or even another workbook!) and bring it in for you with a CLICK.

In order for data click-linking to work, you always need to have the destination cell (the

cell the linked d=data will appear in) begin with the Equals sign. =

- In the 2023Students sheet, click in **cell A67**.
- In cell A67, type <u>only</u> the equals sign: **=**
- Then, while still in the cell, enter the MarchLeads worksheet, and find **cell A5**, and **CLICK** on that cell then *immediately press Enter*. Excel will automatically finish the formula with the cell's address (which is **MarchLeads!A5**) and link the cells.
- In the 2023Students sheet, click in **cell B67** and type <u>only</u> the equals sign.
- Then enter the MarchLeads sheet, and find **cell B5**, and **CLICK** on that cell, then immediately press Enter.
- In the 2023Students sheet, click in **cell C67** and type <u>only</u> the equals sign.
- Then enter the MarchLeads sheet, and find **cell C5**, and **CLICK** on that cell, then immediately press Enter.
- In the **2023Students** sheet, click in **cell D67** and type <u>only</u> the equals sign.
- Then enter the MarchLeads sheet, and find **cell D5**, and **CLICK** on that cell, then

immediately press Enter.

· **SAVE your work**.

ANNNND now, you are asking "Are we there yet??" Almost, yes. Because, we now get to apply the formulas to the cells below the ones we just input.

· In the **2023Students** sheet, click cell **A67** and copy it. Then, paste it down to **cell A68**.

· Check the formula in Cell A68. It should read **=MarchLeads!A6**.

Given that there are 47 more first names in the MarchLeads sheet, you can safely copy the contents of Cell A68 down 47 more cells in Column A, from **cell A69 – cell A115**. All the relevant student first names from the MarchLeads sheet column A will populate the **2023Students** sheet **column A**. Let's try.

· In the **2023Students** worksheet, copy **cell A68**, and paste it into **cells A69 – A115**.

I think I can guess what you are thinking. It is either time to go hydrate with your favorite

beverage, or you can try this fast linking in an even more efficient way.

- In the **2023Students** sheet, select all three cells **B67, C67, and D67**, and copy them.
- Place your cursor at cell **B68**, and select all the cells from **B68 – D115**, then **Paste** using either CTRL / CMD V (Mac), or the Home tab's Clipboard group's Paste icon.
- WHOOSH! All those cells should populate with the click-linked formula for you.
- Are we THERE yet?
- Yes.
- **SAVE your work**.

You should see that all the student last names, states, and email addresses from the MarchLeads sheet have now populated the 2023Students sheet Columns B through D.

One more important thing: This click linking is good to keep active in the populated worksheet if you plan to make minor data changes in the host sheet. However, this means that if the order of the data in the MarchLeads sheet changes, like if that sheet is sorted, the data references in the 2023Students sheet will

repopulate with the new data from the host sheet. In a small spreadsheet, this might not be a real issue. However, imagine a sheet with hundreds of click-linked rows of data suddenly had massive changes in the data, especially if other data in the records did not change with it.

If you are at all concerned about your populated data getting changed on you, you can "break" the link easily, while keeping the data you just click-linked in. Let's do that here.

- In the **2023Students** sheet, select all the data from **Cells A66 – D115**.
- Copy all the data in that selection, then Paste VALUES of the data over itself (the same cells **A66 – D115).**
- Using the Home tab's Clipboard group's Paste icon, click the down arrow for the dropdown paste options menu, and choose **Paste VALUES**.
- Then, click in cell **A66**, which had the click-link value, and you can observe that it no longer has the formula, just the results. The data is safe from any changes, resorts, filters, or other big changes that could

happen in the MarchLeads worksheet.

Let's do a bit more work with this particular sheet, to clean things up.

- Click anywhere in your **2023Students** sheet, then use Insert to convert the **dataset** into an Excel table object with headers.
- Use the Table Design tab's Table Styles group to select the **Turquoise Table Style Light 10** to apply it to the table.
- In the Table Design tab, click the checkbox for **Total Row**.
- Scroll to the bottom of the table, so that you can see the total row below the final student LastName.
- Click in **cell B116**, and you should see a filter down arrow. Click it, and choose **Count**. This gives the count of students listed in the table.
- Now, go up the worksheet to **cell F3**. In the cell, type the equal sign = then click in **cell B116** and press Enter. The number 110 appears in **cell F3**.
- **SAVE your work**.

This is a really useful way of grabbing a lot of data from one place and bringing it over to another. Let's practice it a little more. We'll populate the GraphicsClass worksheet with information from the **2023Students** worksheet.

- In the GraphicsClass worksheet, click on **cell B6**. In it, type **=** then click on one of the cells in the 2023Students worksheet that shows the Comp203 course, like in the record for **Sonora Vargas**. In my sheet, that is **cell F50**.
- In the GraphicsClass worksheet, click on **cell B7**. In it, type **=** then click the 2023Students **cell G50**.
- In the GraphicsClass worksheet, click on **cell B8**. In it, type **=** then click the 2023Students **cell H50**.

If you would like, you can use the rest of the **GraphicsClass** worksheet to practice populating the class with names from records in the 2023Students worksheet of students who are taking the Comp203 – Graphics Suite course.

	A	B	C	D
1		**Ihoosha** Online Training		
2				
3				
4	**Synchronous Sessions**			
5				
6	Course:	Comp203 - Graphics Suite		
7	Quarter:	Winter		
8	CreditSupport:	3		
9				
10				
11	Fname	Lname	State	Email
12				
13				

MedAttrib: author-generated. More click-linking.

Linking Between Workbooks

Another way to get data is to use a similar process but with an external workbook. This isn't quite like importing from a database, though it is a little more complex than the click-linking we have been doing here.

You need to have easy access to the file you want to link to for accessing the specific data. And, the file should be saved into the directory you link from, because if the file is moved, the links could break the current spreadsheet.

In our case, we will use the other Chapter 12 file you hopefully also put into your working folder: **Ch12–DLSupport.xlsx**.

Look at the currently open **Ch12–DataLinking.xlsx** file, for the **2022Fees** worksheet. That worksheet only needs two pieces of information, likely from a 2022 file: the total number of students, and the total amount of fees.

- Open the **Ch12–DLSupport.xlsx** file. There is only one worksheet. Scroll to the bottom so that you can access **row 167**, where there is a count of student last names and a currency number.
- In the **Ch12–DataLinking.xlsx** file's **2022Fees** worksheet, Click cell **C5**, then type **=**
- Then, navigate to the **Ch12–DLSupport.xlsx** file, and click in cell **C167** and immediately press your Enter button. Excel will immediately return to cell **C5** in the **2022Fees** worksheet, and display the count in it.
- Now, In the **Ch12–DataLinking.xlsx** file's **2022Fees** worksheet, Click cell **C6**, then

type **=**

- Then, navigate back to the **Ch12–DLSupport.xlsx** file, and click in cell **H167** and immediately press your Enter button. Excel will immediately return to cell **C6** in the 2022Fees worksheet, and display the currency amount in it.
- Close the **Ch12–DLSupport.xlsx** file without saving it so that only your **2022Fees** worksheet is still open, with the two important numbers.
- Click on each cell that you populated with the imported numbers, and look at the formula contents. This displays the name, sheet, and cell of the external file the data is linked to.
- Click on cell **C6**, and use the Home tab Number group to convert the amount to Currency, with a decimal point and two zeros after it.
- **SAVE your work**, and close the **Ch12-DataLinking.xlsx** file. We're finished!

MedAttrib: author-generated. MS Excel data-linking process from an external file.

Part 4: Formulas and Functions

Perhaps the most valuable feature of Excel is its ability to produce mathematical outputs using the data in a workbook. This section reviews several mathematical outputs that you can produce in Excel through the construction of formulas and functions. The section begins with a chapter on the construction of formulas for basic and complex mathematical computations. Another chapter reviews statistical functions, such as SUM, AVERAGE, MIN, and MAX, which can be applied to a range of cells. Another chapter addresses functions used to calculate mortgage and lease payments as well as the valuation of investments. This section also shows how you can use data from multiple worksheets to construct formulas and functions.

Chapter 13: Formulas - Operations

- Formula Basics
- Parts of a Formula
- Basic Formulas
- Auditing Formulas
- Quick Analysis Tool
- Common Error Codes

This section reviews the fundamental skills for entering formulas into an Excel worksheet. Excel is used for many kinds of calculations: mathematical, statistical, financial, scientific, reference lookups, and more. It is useful in many types of business, and is a key tool in cleaning, calculating, and analyzing data.

Formula Basics

A main strength of Excel is that you can use it to calculate data in many ways. Calculations allow for the development of additional data for analysis and decision making. A spreadsheet full of employees, their salaries, and the value of their benefits packages is useful. Calculating the annual and quarterly costs can be more useful in using for comparisons, preparing for taxes, etc.

Excel formulas are an expression that operates on values in a range of cells and return a result. They let you do calculations like addition, subtraction, multiplication, and division.

Excel functions are also formulas, but they are predefined by Excel for particular business purposes and perform calculations by using specific values, called arguments, in a particular order, or structure.

Formula bar

We've used the formula bar a bit when not directly inputting data into Excel cells. The formula bar reflects what is in a cell. However, its power comes from the ability to write and process formulas, to display named ranges and how the formula is organized, and in helping identify errors.

In the example, the formula bar is displaying a simple calculation for Cell A1. To the left of the field, the small **fx icon** is a way to open the Functions panel and access to the Excel functions library. The checkmark (green when it is active) is a way to approve a formula instead of simply pressing Enter. The X icon (red when it is active) is important because it allows you to back out of the formula bar without saving what is in it. Why is that useful? It can be all too easy to accidentally click in the wrong cell and corrupt a working formula, and the red X lets you stop before you can save and exact the corruption, error, etc.
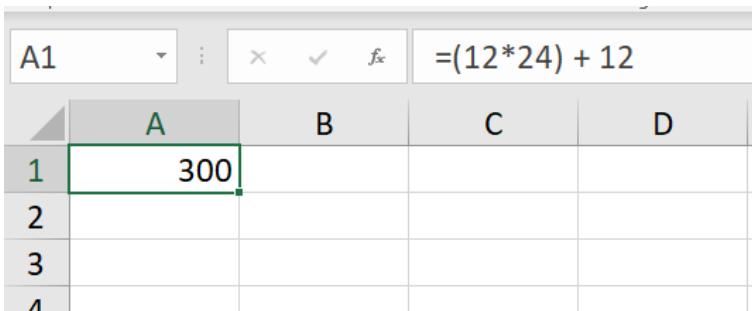
MedAttrib: author-generated. MS Excel formula bar.

Formula Ribbon

In Excel, you can manually input formulas, as we did in the earlier chapter on click-linking to data cells. You can also use the Excel Formula tab/ribbon to access common predefined functions and to look up a wide variety of pre-built formulas in the Excel function library. This is also where we have found the Name Manager tools for naming ranges in a dataset. Those named ranges show up in formulas in a way that keeps a formula from seeming to access random and long strings of cell range information. The named ranges add context in a formula, especially for troubleshooting.
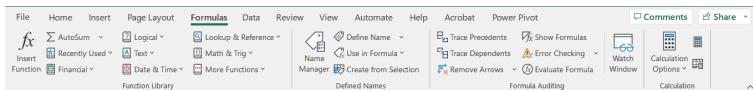
MedAttrib: author-generated. MS Excel Formula ribbon.

The Excel Function Library

Users can access the Function Library from the Formulas tab by clicking on the Insert Function icon. The Insert Function panel opens and allows for a search of formula-related keywords. You can also try to browse through the category dropdown. This is useful to people who work in specific industries in which they use a lot of calculations and know just what to look for, whereas for basic workplace talent, most of the available functions won't mean anything or be useful. The use is in context of one's training in specific career areas requiring calculations.
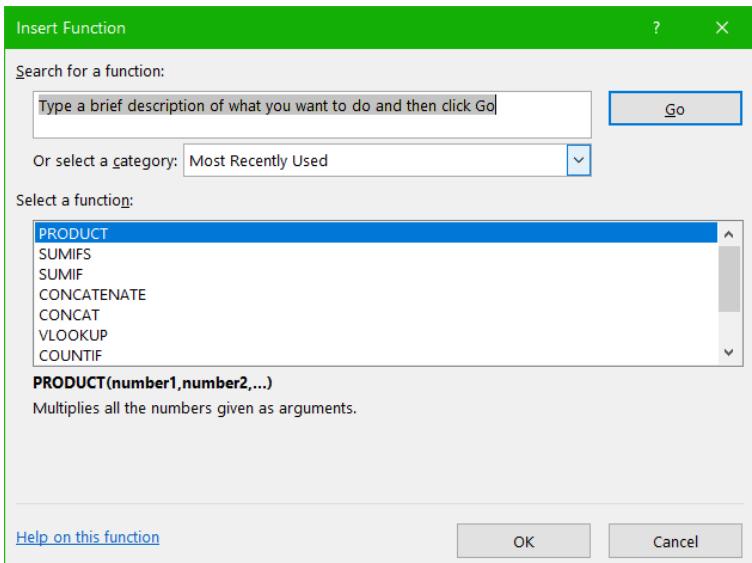
MedAttrib: author-generated. MS Excel Insert function / Function Library access.

TIP: Faster Function library access. Click the FX symbol to the left of the Formula Bar, which opens the Insert Function dialog box. Or you can press SHIFT F3 (function button).

Thinking out formula scenarios

A key part of succeeding in using any formula

or function is to know exactly what you want to accomplish. Students in numbers and data-heavy fields are usually learning the skills for what calculation processes are needed for their field (scientific, accounting, higher-level math, research, etc.), and Excel is a tool to accomplish that. Students in fields that don't work with a lot of data or computations can have trouble formulating the scenario, or words, for what needs to be calculated and why/how. Yet, we need to be able to do this to decide what formula to write or find in the Functions.

Steps

First, keep in mind that any calculation is a kind of combination of a story problem (UGH!) and a test of logic.

- How much is a "service"?
- What is a bonus for a high achieving real estate agent?
- How many products were sold in the last 3 months?
- How many days are in a class quarter?

- If you know someone's name and look it up in a table, can you tell what region they represent or how much property they sold or what grade they earned?

SO, the first thing you have to do is make sure you understand exactly what is being asked. Then you need to figure out what exactly you are trying to reference – *to look at* – so you can pull out the information you need. Then you need to ask Excel the right kind of question in terms Excel can calculate from.

Here's something I learned when I first took a class in basic programming:

- Write out what I think that I'm being asked to do.
- Drink coffee (or fave beverage).
- Write out what steps I think I would need to do to get at the information.
- More coffee.
- Look up / research Excel information to see what the types of calculations I need to do might require.
- Think about stronger coffee, but likely go for calming tea or water.

- Study the basic logic and format of a calculation to see if it can do what I need.
- Take a break for a serious treat or rest.
- Experiment.

Say you are being asked to get a total of the sales from the 8 sales reps who sell coffee to 3 cafes. You would figure (rightly) that you need to see a list of all their sales, then get a total of those numbers. You would be looking to get a grand totals response in terms of currency.

Say you need to find out which coffee roasts sold well over Fall 2022? You would need to figure out how to ask Excel to look up the column of roast flavors, see the quantities sold, and look at this info for only the months of September, October, November, and December 2022. You would need more information to find out if you are supposed to find the count for each coffee, or the dollar amount sold, etc. Then you would need a way to either do a subtotal table, or a lookup table, etc.

Say you (as a teacher) have 30 students who have finished the class and need you to

calculate their final grades. You need to know the students' names, their final points, and some table of what points are equal to what publishable numeric grade. You would need to do some kind of lookup and have the response calculate into your student roster next to their point count so you could accurately update the school grades with the right numeric grade (4.0, 3.8, etc.)

You usually have to logically process what is being asked, and carefully decide what is needed. Take your time, map it out if you need to, and even write a layman's English (or your own first) Language process. Then figure out how to ask Excel to calculate it for you. The Excel Functions menu tab/ribbon and Functions lookup provides wizard windows for every function, so if you know what I need to look for, you can use those quite handily.

Parts of a Formula

When you make a formula in Excel, there are several different components that supply the

source data to the formula and express what operations should be performed on that information. Depending on the formula type, you may need include any or all of the following items:

- **Starting the formula**: In order for Excel to know the cell content will be a formula to be calculated, you need to start by typing the **EQUAL sign =** This tells Excel that the contents of the cell will be an answer to a question (equal to), rather than a string of text or a basic numbers to format in some way.

Your mandatory BFF for all formulas – the EQUAL sign.

- **Constants**: Numbers or text values that you enter directly in a formula, like **=2*3**. This is a manual way of telling a formula what to calculate with.

- **Cell reference**: A reference to a cell that contains the value (item) you want to use in your Excel formula, e.g. **=SUM(A1, B2, C3)**. This allows you to create formulas that can be copied and reused, rather than requiring a manual input of the numbers yourself.
- **Range reference**: To refer to data in two or more contiguous cells, you use a range reference like A1:A5. For example, to sum values in all cells between A1 and A8, inclusive, use this formula: **=SUM(A1:A8)**
- **Named range reference**: A defined name for a cell range, constant, table, or function, such as **=SUM(TaxCol)**. In earlier chapters we created and used named data ranges in part to prepare for working with formulas.

Operators

Operators: These are special symbols that specify the type of operation or calculation to be performed, such as +, *, etc. They tell Excel what the operation, or calculation method, is

to be, like sum, quotient, division, etc. For this chapter, we'll only look at arithmetic.

- Addition: + (plus sign)
- Subtraction: – (minus sign)
- Multiplication: * (asterisk)
- Division : / (forward slash)
- Percent: % (percent sign)
- Exponentiation: ^ (caret)
- Equal to: =
- Greater than: > (greater than sign)
- Less than: < (less than sign)
- Greater than or equal to: >= (greater than or equal to sign)
- Less than or equal to: <= (less than or equal to sign)
- Not equal to: <> (not equal to sign)

The order in which calculation is performed can affect the return value of the formula, so it's important to understand the order, and to use parentheses to change the order to obtain the results you expect to see. If a formula contains operators with the same precedence — for example, if a formula contains both an addition and subtraction operator — Excel evaluates the

operators from left to right. Otherwise, you will want to use parentheses to separate/clarify sections of a formula. For instance, multiplication and division happen before addition and subtraction.

=12+5*3 would be **27**

=(12+5)*3 would be **51**

Excel uses the standard mathematical order of operations. When writing complex formulas it is important to remember this order of operations. You want to be sure that your formulas will calculate in the order you intend. To help you remember which operations will be performed first, you can use the acronym PEMDAS.

P – parentheses

E – exponents

MD – multiplication and division

AS – addition and subtraction

Cell References

Cell References are a way to refer to the **contents** of a cell.

- **Absolute**: Absolute references remain **constant**, no matter where they are copied.
- **Relative**: Relative references **change** when a formula is copied to another cell. This allows a formula to be reused and to pick up the contents of the record around it so that you don't have to manually input all numbers (constants) yourself.
- **Selection**: You select one or more cells while creating a formula or a location reference in another table and/or worksheet.
- **Named**: You can *Define a Name* of a cell so that the cells remain stable in a formula that you copy and paste for further use in other cells in a column. This would be an **Absolute** reference. Otherwise, the pasted formula will change the cell's location reference to be relative to the new row it is seeking to create the formula for. *Example*:

=Fee*20, where the cell I5 has been named FEE, is **more** stable than =I5*20. Other formulas needing the contents of cell I5 would use the named reference FEE instead.

· **Circular Reference**: This happens when a formula is trying to calculate itself, and you have an Excel feature called iterative calculation turned off. It can also happen during indirect references in a formula. It results in errors.

Note: Formulas can be written with only relative references, with only absolute references, or with mixed references.

Basic Formulas

In this chapter, we will keep things straightforward and will work with basic mathematical formulas.

ACTION: Try Me activity

We will work with the Taste du Monde workbook, named **Ch13–Calculations.xlsx**. Make a copy of the file for your Examples folder, then open that copy.

Here is what we are aiming for:

	A	B	C	D	E	F	G
1							
2	**Taste du Monde**						
3	Visit Our Website!						
4							
5		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Currency Sum	Tax Needed
6	New York	$ 201,110.00	$ 184,000.00	$ 191,000.00	$ 190,840.00	$ 766,950.00	$ 64,423.80
7	San Francisco	230,000.00	210,500.00	175,200.00	180,008.00	$ 795,708.00	$ 66,839.47
8	Miami	190,700.00	186,700.00	154,300.00	169,240.00	$ 700,940.00	$ 58,878.96
9	Indianapolis	172,000.00	220,000.00	197,500.00	211,344.00	$ 800,844.00	$ 67,270.90
10	Total All Currency	$ 793,810	$ 801,200	$ 718,000	$ 751,432	$ 3,064,442.00	$ 257,413.13
11							
12						Tax amount:	0.084
13							
14							
15	Sum 72 + 64	136	136				
16	Difference of 678 from 1734	1,056	no function for this				
17	Product of 228 and 34	7,752	7,752				
18	Quotient of 270 and 10	27	27				
19							
20	Subtract E6 from F6	$ 576,110.00					
21	Multiply F10 by 5.5%	$ 168,544.31					
22	Divide F10 by 3	$ 1,021,480.67					
23	Average F6 through F9	$ 766,110.50	Use a named range				
24	Minimum F6 through F9	$ 700,940.00	Use a named range				
25	Maximum F6 through F9	$ 800,844.00	Use a named range				
26							
27	Add B6-B9, then multiply by .	$ 762,057.60					
28	Add C6-C9, then divide by 3	$ 267,066.67					
29							

MedAttrib: author-generated. MS Excel Ch13 finished calculations.

The workbook has only one sheet, which is more of a worksheet than a practical company ledger.

Let's start with the basic manual math.

The formulas begin with the = sign, to tell Excel something is being calculated, an answer will be provided.

Remember: **Your mandatory BFF for all formulas – the EQUAL sign.**

- Cell B15 needs to add 72 and 64, which is a sum. In B15, type **=72+64** with no spaces.
- Cell C15 can use this function instead: **=SUM(72, 64)**
- Cell B16 needs to subtract 678 from 1734, which is a difference. **= 1734-678.**

  ○ **NOTE**: There seems to be no comparable subtraction function in Excel.
- Cell B17 needs to multiply 228 and 34, which is a product. **=228*34**
- Cell C17 can use this function instead: **=PRODUCT(228, 34)**

- Cell B18 needs to divide 279 by 10, which is a quotient. **=270/10**
- Cell C18 can use this function instead: **=QUOTIENT(270, 10)**
- Set the data format in cells B15-C18 to **Comma, NO decimals**.
- **SAVE your work**.

Relative References

Relative: Relative references **change** when a formula is copied to another cell. What this means is that if you create a formula to sum up the total numbers of a row, then paste that same formula down one cell to sum up the total numbers of the next row, Excel will assume you want the references to the cells with the numbers in the new row to change inside the pasted formula.

Row 1's Cell D1: cell A1 + cell B1 + cell C1 would equal the total of the numbers in those 3 cells. The formula in cell D1 would be **=A1+B1+C1**

Then, pasting **=A1+B1+C1** into Row 2's cell **D2**

would automatically change it to **=A2+B2+C2,** because Excel assumes you want the formula to calculate the proper total for **Row 2** information. This is what a "relative" reference in a formula in Excel means.

Relative references in a formula allow a formula to be reused and to pick up the contents of the record around it so that you don't have to manually input all numbers (constants) yourself.

Now, let's add some of the things in the Taste du Monde table.

- Cell F6 needs to add cells B6-E6, and because there are several numbers, the Excel formula that uses a Relative reference to those cells will do the job: **=SUM(B6:E6)**
- Cell F7 needs to add cells B7-E7. Let's **copy** the formula from cell F6 and **paste** it into cell F7 and learn what happens.

NOTE: Relative Reference. Copying the formula from Cell F6 and pasting it Into Cell F7, and having that change the

formula to calculate the sum of Cells B7-E7, is an example of Relative References. Excel was able to adjust the formula to be *relative to the data related to Cell F7*, instead of simply copying the exact numbers from Cells B6-E6.

- Cell F8 needs to add cells B8-E8. **Copy** the formula from cell F6 and **paste** it into cell F8.
- cell F9 needs to add cells B9-E9. **Copy** the formula from cell F6 and **paste** it into cell F9.
- Now, we **cannot** do this for cell F10. Why? Because cell F10 is supposed to be the sum of Cells F6-F9, the cells above it in the column.
- Type **=SUM(F6:F9)**

Let's get a little more experience and range. Rows 17-22 ask for a little more, and we'll need to think about the order of operators – the order of what we calculate – when more than one calculation is happening in the formula.

- Cell B20: **=F6-E6**

- Cell B21: **=F10*0.055**
- Cell B22: **=F10/3**
- **SAVE your work**.

Before we calculate the next three, it would be useful to create a named data range instead of referring to the range of cells more manually.

- Select Cells **F6 through F9**, then use the Formulas tab, Defined Names group, Define Name dropdown, **Define Name selection**, and type **RegionSums** in the Name field, then click OK.

Now these three functions should work properly as typed:

- Cell B23: **=AVERAGE(RegionSums)**
- Cell B24: **=MIN(RegionSums)**
- Cell B25: =**MAX(RegionSums)**
- Then, lets also try B27: **=SUM(B6:B9)*0.96**
- B28: **=SUM(C6:C9)/3**
- **SAVE your work**.

Absolute References

Absolute references remain **constant**, no matter where they are copied. This means that the number inside a specific cell (like a tax rate or a specific discount percentage) should remain the exact same info in every instance of a formula it is used in. This is useful if you need one value (number) in a formula to remain the same no matter what rows of data are being calculated against it. We'll do this with the Tax Needed cells in column G.

An absolute reference is referred to differently in a formula / function. The idea is the tell Excel to freeze the reference so that it remains static – the same cell, no matter how it is used in a column that might otherwise auto-calculate relative references for you.

The Absolute reference format uses a **dollar symbol ($)** before the cell's coordinates to make the cell reference fixed/absolute. An example would be referring to the Cell G12 – a tax amount – as **$G$12** in a calculation. Let's try.

- Cell G6: **=F6*$G$12**   This is to calculate the

tax needed for the New York currency sum.

- Cell G7: **Copy cell G6 and paste in cell G7**. Notice the formula still refers to the tax info in $G$12, which is absolute to Cell G12, which is what we want. Yet, the relative reference to cell F6 changes to F7 to let Excel calculate the tax needed relative to the San Fransisco currency sum.
- Cell G8: **Copy cell G6 and paste in cell G8**.
- Cell G9: **Copy cell G6 and paste in cell G9**.

Again, we **cannot** do this for cell G10. Why? Because cell G10 is supposed to be the *sum of cells G6-G9*, the cells above it in the column.

- Type **=SUM(G6:G9)**
- **SAVE your work**.

TIP: Use Universal Constants. There will be times when you are writing formulas that you will need to use universal constants, or numbers that do not change, such as the number of days in a week, weeks or months in a year, and so on. For example, if you are calculating

the monthly cost of an item when you know the yearly cost, you will always divide by 12 since there are 12 months in a year. In this case, you use the constant of 12 instead of a cell reference because the number of months in a year never changes.

Auditing Formulas

Excel provides a few tools that you can use to review the formulas entered into a worksheet. For example, instead of showing the outputs for the formulas used in a worksheet, you can have Excel show the formula as it was entered in the cell locations. This is demonstrated as follows:

- With the **Ch13Calculations.xlsx** file open, click the Formulas tab of the ribbon.
- Click the **Show Formulas** button in the Formula Auditing group of commands. This displays the formulas in the worksheet instead of showing the mathematical outputs.

	A	B	C	D	E	F	G
1	Taste du Monde						
2							
3	Visit Our Website!						
4							
5		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Currency Sum	Tax Needed
6	New York	201110	184000	191000	190840	=SUM(B6:E6)	=F6*$G$12
7	San Francisco	230000	210500	175200	180008	=SUM(B7:E7)	=F7*$G$12
8	Miami	190700	186700	154300	169240	=SUM(B8:E8)	=F8*$G$12
9	Indianapolis	172000	220000	197500	211344	=SUM(B9:E9)	=F9*$G$12
10	Total All Currency					=SUM(F6:F9)	=SUM(G6:G9)
11							
12						Tax amount:	0.084
13							
14							
15	Sum 72 + 64	=72+64	=SUM(72,64)				
16	Difference of 678 from 1734	=1734-678	no function for this				
17	Product of 228 and 34	=228*34	=PRODUCT(228,34)				
18	Quotient of 270 and 10	=270/10	=QUOTIENT(270,10)				
19							
20	Subtract E6 from F6	=F6-E6					
21	Multiply F10 by 5.5%	=F10*0.055					
22	Divide F10 by 3	=F10/3					
23	Average F6 through F9	=AVERAGE(RegionSums)	Use a named range				
24	Minimum F6 through F9	=MIN(RegionSums)	Use a named range				
25	Maximum F6 through F9	=MAX(RegionSums)	Use a named range				
26							
27	Add B6-B9, then multiply by .96	=SUM(B6:B9)*0.96					
28	Add C6-C9, then divide by 3	=SUM(C6:C9)/3					
29							

MedAttrib: author-generated. MS Excel Ch13 finished calculations showing formulas.

- Click the Show Formulas button again. The worksheet returns to showing the output of the formulas.

You can also toggle Show Formulas on and off using the keyboard. Hold down the CTRL key while pressing the ` **key**.

Keyboard Shortcut: Show Formulas. Hold down the CTRL key while pressing the accent symbol.

Two other tools in the Formula Auditing group of commands are the **Trace Precedents** and **Trace Dependents** commands. These commands are used to trace the cell references

used in a formula. A precedent cell is a cell whose value is used in other cells. The Trace Precedents command shows an arrow to indicate the cells or ranges (precedents) which affect the active cell's value. A dependent cell is a cell whose value depends on the values of other cells in the workbook. The Trace Dependents command shows where any given cell is referenced in a formula. The following is a demonstration of these commands:

- Click cell **G12**.
- Click the Trace Dependents button in the Formula Auditing group of commands in the Formulas tab of the ribbon. A blue arrow appears, pointing to cell **G6**. This indicates that cell **D3** is referenced in a formula entered in cell **F3**.
- **IF NEEDED for an instructor's assignment, SCREENSHOT HERE.**
- Click the Remove Arrows command in the Formula Auditing group of commands in the Formulas tab of the ribbon.

This removes the Trace Dependents arrow.

- Click cell **F10**.
- Click the Trace Precedents button in the Formula Auditing group of commands in the Formulas tab of the ribbon. A blue arrow with dots in cell F6, and pointing to cell F10 appears. This indicates that cells D3 and E3 are references in a formula entered in cell F3.
- Click the Remove Arrows command in the Formula Auditing group of commands in the Formulas tab of the ribbon.

This removes the Trace Precedents arrow.

- **SAVE your work**.

Quick Analysis Tool

The Quick Analysis Tool allows you to visualize data with a couple of steps. For instance, it is meant to be a quick way you can add the visual of sparklines of in-cell charting to pair your info in a table with a visual enhancement. However, it now seems to be an add-on pack, which we won't do now. *If you do want to add*

this to your Excel for PC or MAC, you will need to:

- Click the File tab then click Options.
- Click the Add-Ins category.
- In the Manage box, select Excel Add-ins then click Go.
- In the Add-Ins available box, select the Analysis ToolPak checkbox, then click OK.

To use the Quick Analysis, Be sure to press CTRL ~ to return your spreadsheet to the normal view (the formula results should display, not the formulas themselves).

- Select the range of cells **B6:E9.**
- In the lower right corner of your selection, you will see the Quick Analysis tool (see **Figure 3.4**).
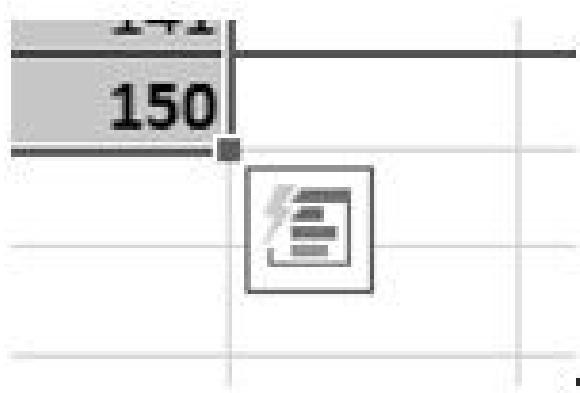
MedAttrib: author-generated. MS Excel Quick Analysis pop-up.

When you click on it, you will see that there are a number of different options. Alternatively, you can right-click on the selected range and choose QuickAnalysis from the dropdown list. This time we will be using the **Totals** option.

- Select **Totals**, and then the **SUM** option. Selecting that SUM option places =SUM() calculations in row 10.
- **SAVE your work** and close the file. We're done with it.

MedAttrib: author-generated. MS Excel Quick Analysis Totals/Sum result.

Common Error Codes

Excel presents a number of error codes when a formula doesn't work properly. And, for learners who work with Excel for standard/casual practice, the codes may not mean a lot or tell you exactly how to fix the problem. Excel tends to be somewhat obtuse in explaining a problem, because the explanation is general to the "type" of issue the program can't resolve,

not the exact nature of your actual formula and formula data. SUPER ugh!

However, when you get one of these, Excel does offer you a small green or yellow icon right by the error formula that you can click for a link to some help. There also tend to be Microsoft error code info pages, and responses to doing an Internet search.

These codes should give you something to start with,

- #DIV/0! Trying to divide by 0
- #N/A! A formula or a function inside a formula cannot find the referenced data
- #NAME? Text in the formula is not recognized
- #NULL! A space was used in formulas that reference multiple ranges; a comma separates range references
- #NUM! A formula has invalid numeric data for the type of operation
- #REF! A reference is invalid
- #VALUE! The wrong type of operand or function argument is used

Chapter 14: Functions - Data Management

- Concatenation
- Proper Function
- Text to Columns
- Left/Right Functions
- Hyperlink Function

A lot of data you will use in Excel may be text, as well as numbers. You may inherit spreadsheets with data in inconsistent formats, such as when it is imported from other sources or added manually from data entry. You may be tasked with making existing data which works very well in the workbook appear differently to be better able to be viewed in charts and output materials. Various functions exist that allow you to do these things, without actually being

functions that calculate number. These functions are for Data cleanup. Here are a few common ones:

Function	Description
ARRAYTOTEXT	Gives an array of text values from any specified range
CLEAN	Removes all nonprintable characters from text
CONCAT	Combines text from multiple ranges and/or strings, but doesn't provide delimiter or IgnoreEmpty arguments.
CONCATENATE	Merges several text items into one text item
FIND, FINDB	Finds one text value within another, and is case-sensitive
LEFT, LEFTB	Gives the leftmost characters from a text value
LOWER	Converts text to lowercase
PROPER	Capitalizes first letter in each word of a text value
REPLACE, REPLACEB	Replaces characters within text
RIGHT, RIGHTB	Gives the rightmost characters from a text value
TEXTSPLIT	Splits text strings by using column and row delimiters
TRIM	Removes spaces from text
UPPER	Converts text to uppercase

MedAttrib: author-generated. MS Excel data management functions.

An important thing to learn about Concatenation and other text/dummy info formulas like those in the image above is that you are essentially changing, blending or separating contents of cells so that your spreadsheet can use the same information differently.

- For instance, if you have a column of customer names with both the first and last name in it, and you want to be able to

sort the sheet by last name, you may not be able to do so unless you separate out the first and last names in that single column into two separate columns. Text to Columns can do this.

- Conversely, you may have two-three columns of information that would be more useful if they were combined into one column. Concatenation (blending) can do this.

- You may have a spreadsheet with columns that have all the letters in all capitals, and want them to appear in upper and lower case instead; text-changing functions like UPPER, LOWER, and PROPER can help with that.

- Adding or removing spaces, or specific characters in a column of cells, can be done with the LEFT, RIGHT, REPLACE, TRIM, CLEAN, and their variants.

NOTE: Static Value/Dummy Text is when you need a part of a formula/function to be treated exactly a specific way, rather than allowing Excel to convert it automatically as if it was a number or a calculation portion of a formula.

For instance, if you want numbers, or a space, or a symbol like a dash to be treated as a *piece of static text* in a concatenation formula, you will need to add that piece inside of quotation marks or else Excel might try to autoformat the result as a number format or not recognize the space or symbol. *Example*: using the number 001 in a concatenation or other formula would be autoformatted as 1, whereas **"001"** (with the quotes around it) will appear in a formula's results (like concatenation or splitting columns) as 001. A space meant to be a static value/dummy text should be input as **" "** and a symbol as **"@"** .

In this chapter, we'll practice four common text-based formulas so that you can get a feel for what you can accomplish.

Proper Function

ACTION: Try Me activity

We will work with a Prisvard Tech workbook,

named **Ch14-Concat.xlsx**. Before you start working, go to your DataFiles folder and make a copy of the file for your Examples folder, then open that copy. Let's see what we are aiming for:

	A	B	C	D	E	F	G	H	I	J	K
1						Prisvard Tech					
2						SalesRep Emails					
3											
4	UpFname	UpLname	PropFname	PropLname	Cell Phone	ConCatName	Fname	Lname	Partial	RepID	Email
5	SHANE	MORGAN	Shane	Morgan	(800) 555-8478	Shane Morgan	Shane	Morgan	Mor	Mor-001	Shane.Morgan@prisvard.com
6	NINI	IGWE	Nini	Igwe	(800) 555-5023	Nini Igwe	Nini	Igwe	Igw	Igw-001	Nini.Igwe@prisvard.com
7	JIE	ISHIDA	Jie	Ishida	(800) 555-1435	Jie Ishida	Jie	Ishida	Ish	Ish-001	Jie.Ishida@prisvard.com
8	RILEY	MCCANDLESS	Riley	McCandless	(800) 555-6799	Riley McCandless	Riley	McCandless	McC	McC-001	Riley.McCandless@prisvard.com
9	RONON	SAKAI	Ronon	Sakai	(800) 555-6238	Ronon Sakai	Ronon	Sakai	Sak	Sak-001	Ronon.Sakai@prisvard.com
10	INAYA	ALI	Inaya	Ali	(800) 555-9374	Inaya Ali	Inaya	Ali	Ali	Ali-001	Inaya.Ali@prisvard.com
11	KESHAWN	JEANTY	Keshawn	Jeanty	(800) 555-6232	Keshawn Jeanty	Keshawn	Jeanty	Jea	Jea-001	Keshawn.Jeanty@prisvard.com
12	NIESHA	SMITH	Niesha	Smith	(800) 555-1752	Niesha Smith	Niesha	Smith	Smi	Smi-001	Niesha.Smith@prisvard.com
13	TALIA	BLOOM	Talia	Bloom	(800) 555-5346	Talia Bloom	Talia	Bloom	Blo	Blo-001	Talia.Bloom@prisvard.com
14	RAFE	BENALLY	Rafe	Benally	(800) 555-6699	Rafe Benally	Rafe	Benally	Ben	Ben-001	Rafe.Benally@prisvard.com
15	RIVER	AGUILAR	River	Aguilar	(800) 555-1756	River Aguilar	River	Aguilar	Agu	Agu-001	River.Aguilar@prisvard.com

MedAttrib: author-generated. MS Excel Data Management results.

The workbook has only one sheet, named SalesReps. It is mostly empty, and needs us to create new email addresses for the reps. The names are currently in uppercase, and in two columns, which will be hard to make email addresses from.

We'll work from left to right to accomplish several data conversion tasks until we can create the email address for each rep.

Like numeric/calculation formulas and functions, these formulas begin with the **=** sign,

to tell Excel that something is being changed and that an answer will be provided.

First, lets change the Sales Reps names from being upper case to a proper case.

- Click on cell **C5**. We need to convert cell **A5** from allcaps to a proper format, from SHANE to Shane. We will do this in cell **C5** which is the column called PropFName.
- We'll use the Proper function, which changes the case of letters in text data for us. We'll need to find the function.
- While in cell **C5**, click the **FX insert function symbol** just to the left of the Formula bar.

A dialog box opens:
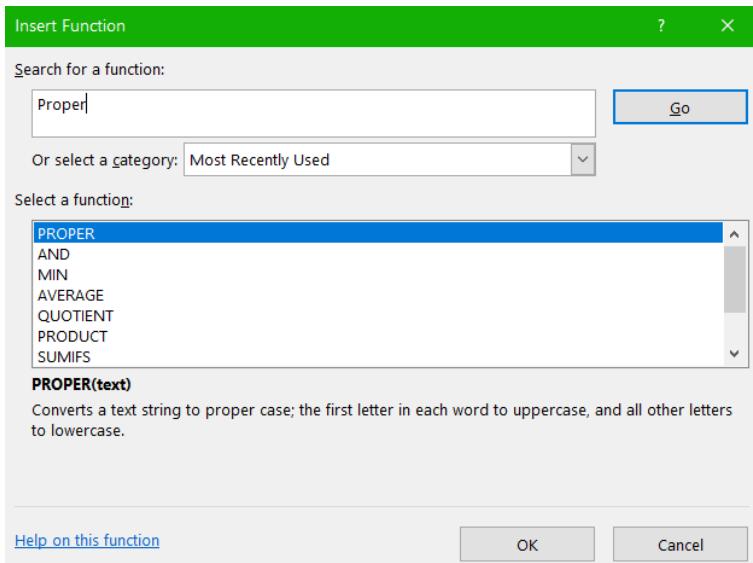
MedAttrib: author-generated. MS Excel data Insert Function dialog box.

- In the "Search for a function" field, type **Proper**, then click GO.
- From the list of resulting functions, choose **Proper**, then click OK.

Another dialog box will open: Function arguments.
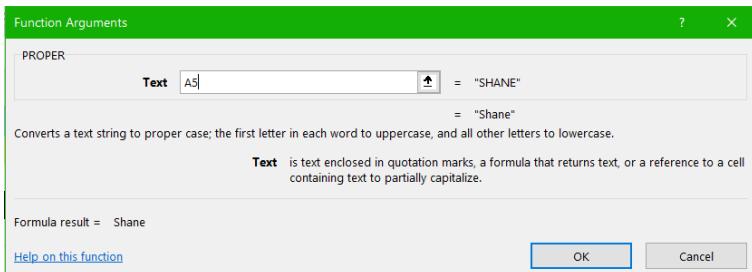
MedAttrib: author-generated. MS Excel data Function Arguments dialog box.

This dialog box asks you to tell you want should be converted. The easiest way is to either type the name of the cell to be converted, or to click on the cell.

> **TIP: Cell referencing in Function dialog fields. While building a function/ formula, including while in a Function dialog box, you can click on a cell in your worksheet to reference it in a cell. Leave the dialog box open, find the cell in your workbook, click on it, and the reference will appear in the dialog box field.**

- While in the dialog box, click on cell **A5**. The dialog box will populate the field with

the contents of A5 (SHANE), preview what it looks like, and preview what the results of the function will be (Shane).

- Click **OK** to finish the function calculation.

We need to do the same thing to Shane's last name in cell D5.

- Click on cell **D5**, and click the **FX insert function symbol** just to the left of the Formula bar. The Insert Function dialog box will open, and the first item in the list will likely be **PROPER** since we just used it. Click that top open the Function Arguments box.
- In the dialog's Text field, type **B5**, and review the previews before clicking OK.
- Let's copy this function through the remaining C and D column.
- Select cell C5 and D5, CTRL **C** to copy (CMD C for Mac), then paste them into cells **C6-D15**. This will populate the proper first and last names for us.

Cell D8 has a problem, which we will have to handle manually. Mccandless should be

McCandless per conventional spelling of a name beginning "Mc".

- Select cell **D8**, copy it, and use **Paste Values** to replace the formula with the text results of the formula. This way, you can change the cell contents manually without interfering with a formula.
- In cell **D8**, change Mccandless to **McCandless**.

Concatenation

Next, we need to merge the contents of the C column cells and D column cells together so that we can have both the first and last name of the Sales Reps in the same column. This will allow us to use them to build and email address. We will use the Concatenate function, which lets us set up a formula *that also accounts for adding space between* the first and last names.

- Click in cell **F5**, and use the **FX symbol** by the formula bar to open the Insert

Function Dialog.
- In the search field, type **concate**, and click GO.
- Choose **Concatenate**, which opens the Function Arguments dialog.

In this case, the function starts with 2 fields, since the function is about combining more than one cell/piece of data. I our case, we will need 3 (three). Pay attention below.

- In the **first** field, type **C5**.

In the **second** field, we actually have to specify that *we need a space between the first and last name* in the function results, or the first and lastname will appear as ShaneMorgan. We also have to use quote marks to reference the space, because Excel expects that all arguments in a function are the data contents of a cell, not something you insert from another source.

- In the **second** field, type **" "** which is an *open quote, a space, and a closed quote*.

Note that a third field appears as you use the

second field. Excel can string together several items to make a concatenation, and adds fields as you use one so that you have the option to populate them with needed data.

- In the **third** field, type **D5**, then click OK.
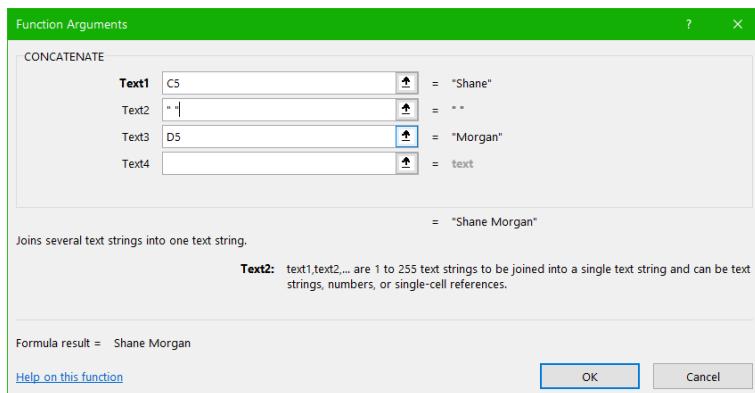
MedAttrib: author-generated. MS Excel data Function Arguments for Proper dialog box.

Cell **F5** now should show Shane Morgan, which is the joining of the contents of cells **C5** and **D5**.

- Copy the contents of Cell F5 into cells **F6-F15** to populate them with the data.
- **SAVE your work**.

Text to Columns

This is a good time to find out how to separate data in one column into two columns. For this to work, however, Excel needs the data to be separated to be a <u>static value</u>, **not** the results of a formula. This static value is 'dummy text' that Excel can't autoformat for us, as noted at the beginning of this chapter.

- Select cells **F5-F15**, copy, and paste the range over itself as **Paste Values**. This removes the formula while retaining the results of the formula.

Next, let's separate the contents of cell F5 into cells G5 and H5.

- Select cell **F5**, the go to the Data ribbon, Data Tools group, and click the **Text to Columns icon**.

A Wizard will open. We need to tell this wizard that Shane Morgan (2 words with a space between them) needs to be separated into one word for each of Cell G5 and H5.

TIP: Excel Wizards. Excel has a few Wizard mini apps that are like built-in action macros, They have several steps that allow you to make choices so that Excel can perform an otherwise complex action for you.

In the Wizard, you are in Step 1, which asks for you to interpret the original data type. Ours is **delimited**, because the text has been delimited (positioned) by a space.

- Click **Next**.
- Choose the Delimiter (item that affected the placement of Shane and Morgan, which is the space between them). You may have to uncheck every one, then choose only the **Space delimiter**.
- Click **Next**.

The third step needs you to tell Excel where the new data will go. Because the data will be split into 2 columns (first and last name), it will need 2 empty columns already available to put the split into. We have them, with columns G and H. However, Excel needs you to only specify the

first of the columns and it will populate both columns for us.

- In the Destination field, type **$G$5** to specify a fixed place. An Absolute reference is needed so only that one cell is referred to.
- Click **Finish**.
- **SAVE your work**.
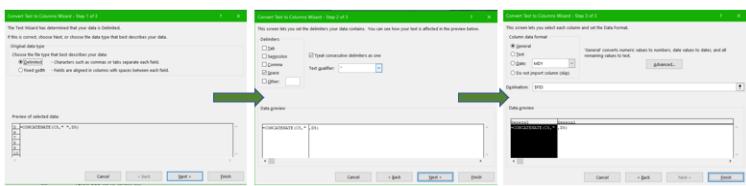
MedAttrib: author-generated. MS Excel Text to Columns wizard.

Observe that cell **G5** should have Shane in it, and **H5** should have Morgan in it.

There is one problem. The contents of cells G5 and H5 are not actually formulas for you to copy and paste down. The column split worked for only one row.

Let's do the rest.

- Select cells **F6-F15**.
- Click the Data ribbon's **Text to Columns icon**.
- In Step 1, make sure that **Delimited** is selected, then click Next.
- In Step 2, make sure that only **Space is check marked**, then click Next.
- In Step 3, in the Destination, type **$G$6**, then click **Finish**.

Cells G6-H15 should now be populated.

- Because they default populated in a centered text alignment, use the Home tab **Format Painter** to select the Format of cell D5 and apply it to Cells G5-H15.
- **SAVE your work.**

LEFT/RIGHT Functions

Next, we want to capture only part of a Sales Rep's last name in column H for a new creation of a RepID. We'll put the formula for this into column I, and use the LEFT function to capture the first 3 letters of the SalesReps last names.

In order to do this, we need to tell Excel exactly which letters we need it to pull and put in the column I.

- Select **Cell I5**.
- Click the **FX symbol** by the Formula bar, and in the search, type **left**.
- Double-click the **LEFT** entry in the resulting list.
- In the Function Arguments dialog, type the needed Cell you plan to get the letters from, which is **H5**.
- In the Num_Chars field, type **3**, so that we can get the first 3 letters of the last name.
- Click **OK**.
- **SAVE your work.**
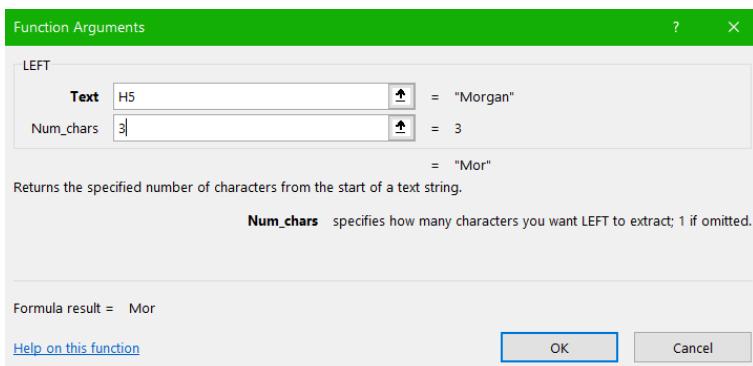
MedAttrib: author-generated. MS Excel LEFT Function Arguments dialog.

- In Cell I5, you should see Mor. It is centered text, so **left align it**.
- Copy Cell I5 into **I6-I15**. This should populate the working formula down the rest of the data range's column.

Let's concatenate the Column I partial names with a number to make a SalesRep ID number in <u>column J</u>. An example of what we mean by this is to create a SalesRep ID number that looks like **Mor-001**.

- Click cell **J5**, and then click the **FX symbol** by the formula bar (or choose Formulas ribbon, Insert Function icon).
- In the search field, type **concat**, and click GO.
- Choose **Concatenate** from the list and click OK.
- In the Function Arguments, type **I5** in the first text field.
- In the second field, type **"-"** (*quote dash quote*).

- In the third field, type **"001"** **Note** that this number needs to be inside quote marks so that Excel does not autoformat the number to the digit 1.
- Click **OK**. *You should now see **Mor-001** in cell J5.*
- Left-align cell **J5**.
- Copy cell J5 to **J6-J15**. This will populate these cells with the relative SalesRep ID numbers.

Finally, let's create the email address. This will also be a concatenation of several fields this time. We are 'stringing' pieces of static data together into one column so that each sales rep has a unique email address built in part from their first and last name and the Prisvard email address.

- Click cell **K5**, and then click the **FX symbol** by the formula bar.
- Choose **Concatenate** from the list and click OK.
- In the Function Arguments, type **G5** in the first text field.
- In the second field, type **"."** (*quote period*

quote).

- In the third field, type **H5**
- In the fourth field, type **"@prisvard.com"** with the quote marks.
- Click **OK**. *This should give you Shane.Morgan@prisvard.com in cell K5.*
- Left-align cell **K5**.
- Copy Cell K5 to **K6-K15**. tot populate these cells with their relative email addresses.
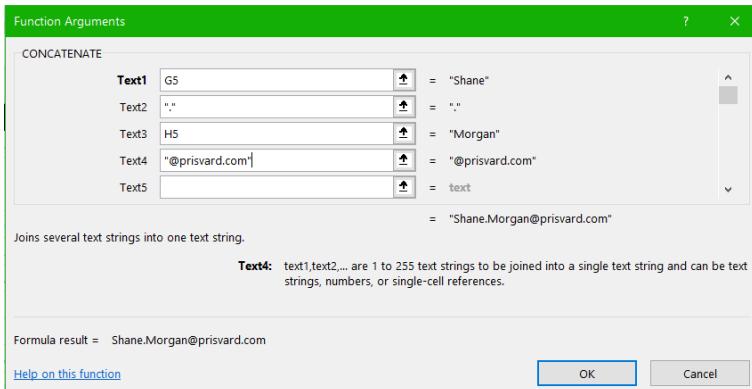
MedAttrib: author-generated. MS Excel CONCATENATE Function Arguments dialog.

- **SAVE your work**, and close the file. **We're done!**

Hyperlink Function

Hyperlinks are active links to different locations, like to a website, to an email address, and to another location in a existing file. We see them frequently in websites – their navigation links, their link to their comment and sign-up forms, their links to other websites and online resources, etc. Hyperlinks can be and are used in documents off the web, too. For instance, in a master's thesis or a novel written in a Word document, the table of contents will link to 'anchors' in the paper's pages that begin sections or chapters. In Excel, hyperlinks are useful to link to external websites, as an example.

Excel has multiple ways of adding/editing hyperlinks. You can set Excel to default to automatically changing a text URL (website or email address) to an active clickable link. You can manually add hyperlinks as you need them. Or, you can use a function that will allow you to add or edit multiple hyperlinks at one time.

Default Hyperlinks

In Excel, you can set the program to automatically change the text for a website URL or online email address to a clickable hyperlink. Actually, this is already the default, but sometimes you might want to turn it off. Why?

When an Excel cell has an active hyperlink in it, the whole cell act like the clickable hyperlink. When you select the cell to edit it, the hyperlink will click and try to pen your computer's default browser then go to the hyperlinked URL. This can get annoying.

In Excel's backstage area – accessed on the PC through the File tab, you can find the hyperlink setting under Options / Proofing / Autocorrect Options, and in the resulting Autocorrect dialog window, under the Autoformat as you type tab. The actual command is "Internet and network paths with hyperlinks ", and when this is check-marked, it is active. To stop Excel from doing this, uncheck the box.
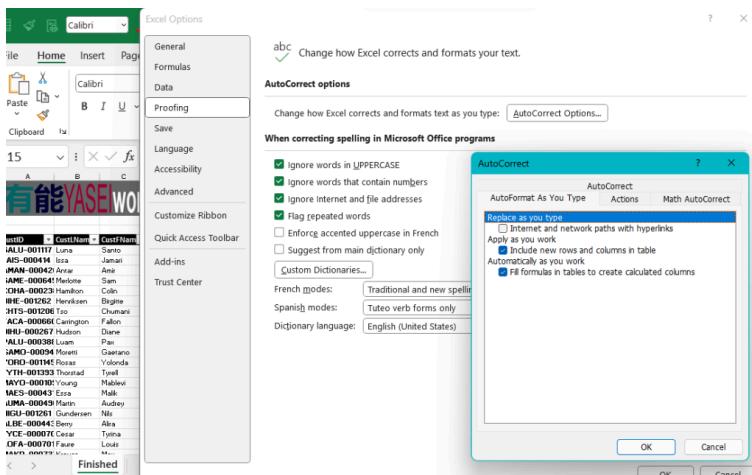
MedAttrib: author-generated. MS Excel default hyperlink option.

Individual Hyperlinks

When in a worksheet, you can select a cell that has an un-hyperlinked URL/email address in it, and make it active manually. We noted this in Chapter ____. To refresh:

- Select the needed cell A3.
- In the **Inserts ribbon,** click the **Hyperlink** button (near the middle right). There may be a list of recent documents you have used, but ignore those for now; click **Insert**

Link which is listed at the bottom of the dropdown.

Insert Link will open an **Insert Hyperlink panel**, which offers the options to link to: "an existing file or web page", a "place in the same workbook", a "new creation of another document", or "an email address".

MedAttrib: author-generated. MS Excel Insert hyperlinks.

- Choose the Existing File or Web Page option.
- Then, in the **Address field** at the bottom of the panel, type the URL or Email address.

Keyboard Shortcut: Add Hyperlink. Hold down CTRL key while pressing letter K on your keyboard / Mac CMD K.

Function for Mass Hyperlinks

Sometimes, you may need to change a whole column of static text showing hyperlinks into active, clickable ones. There is a fairly basic function for that. Keep in mind that this will definitely be a formula using relative references – if you use a version to refer to specific cells.

HYPERLINK(link_location, [friendly_name])

- Link location (required) is the web page, email address, file location, or document anchor location.
- Friendly name (optional) is the name of the web page, or the person who owns the email, or the document being linked to.

Examples:

=HYPERLINK("http://www.shoreline.edu", "Shoreline Community College")

=HYPERLINK("#Sheet2!A1", "Sheet2")

=HYPERLINK("C:\SCHOOL\BUS150\DataFiles\ Links.xlsx", "Excel Links File")

=HYPERLINK(B2, A2)
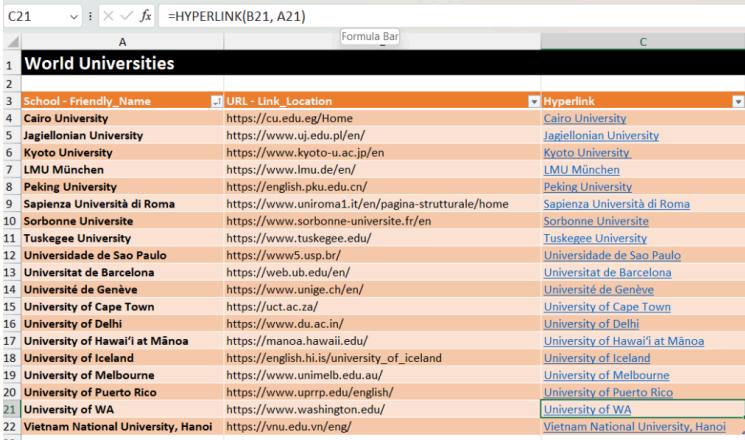
	A	B	C
1	**World Universities**		
2			
3	School - Friendly_Name	URL - Link_Location	Hyperlink
4	Cairo University	https://cu.edu.eg/Home	Cairo University
5	Jagiellonian University	https://www.uj.edu.pl/en/	Jagiellonian University
6	Kyoto University	https://www.kyoto-u.ac.jp/en	Kyoto University
7	LMU München	https://www.lmu.de/en/	LMU München
8	Peking University	https://english.pku.edu.cn/	Peking University
9	Sapienza Università di Roma	https://www.uniroma1.it/en/pagina-strutturale/home	Sapienza Università di Roma
10	Sorbonne Universite	https://www.sorbonne-universite.fr/en	Sorbonne Universite
11	Tuskegee University	https://www.tuskegee.edu/	Tuskegee University
12	Universidade de Sao Paulo	https://www5.usp.br/	Universidade de Sao Paulo
13	Universitat de Barcelona	https://web.ub.edu/en/	Universitat de Barcelona
14	Université de Genève	https://www.unige.ch/en/	Université de Genève
15	University of Cape Town	https://uct.ac.za/	University of Cape Town
16	University of Delhi	https://www.du.ac.in/	University of Delhi
17	University of Hawai'i at Mānoa	https://manoa.hawaii.edu/	University of Hawai'i at Mānoa
18	University of Iceland	https://english.hi.is/university_of_iceland	University of Iceland
19	University of Melbourne	https://www.unimelb.edu.au/	University of Melbourne
20	University of Puerto Rico	https://www.uprrp.edu/english/	University of Puerto Rico
21	University of WA	https://www.washington.edu/	University of WA
22	Vietnam National University, Hanoi	https://vnu.edu.vn/eng/	Vietnam National University, Hanoi
23			

Formula Bar — C21 =HYPERLINK(B21, A21)

MedAttrib: author-generated. MS Excel mass hyperlinks.

NOTE: This is an example – if you want to practice, you can reopen the **Ch14-Concat.xlsx** file, and try this mass hyperlink formula for the emails in Column K. If you do, be sure create a new column in Column L, and call it something

like EmailLinks, do the formula in there, and when finished to **SAVE your file** before closing it again.

Remove Mass Hyperlinks

This question here is whether to remove the clickable hyperlink, or the field altogether.

IF you want to remove the clickable hyperlinks in a column, you can select the whole column, copy it, then paste values over itself to keep only the text content, not the formula. This problem here is if you do this over a column in which all the hyperlink addressed are displayed as Friendly Names, the actual URL address will be stripped out of the cell when the formula is removed. So, ONLY use this on columns in which you can read the actual URL address.

Chapter 15: Functions - Statistical

- Average Functions
- Count Functions
- Sum Functions
- Round Functions
- Value-finding Functions
- Time Functions

In this chapter, we will cover some statistical functions. Many of these are routine to general support functions in a number of businesses, and may also appear in some academic/ training courses. Statistical functions are about calculating things like averages of data, counts of items, and sums of values. They are also basic mathematical functions that need additional criteria to clarify what is being calculated.

In review, **formulas** are various forms of calculations that can be developed and written as needed.

Functions are predefined formulas, of which Excel has many to make getting work done more efficient. Functions tend to fall into various areas of focus, like statistics, scientific, mathematic, financial, data retrieval, and more.

The components of a function are as follows: **=FunctionName(Arguments)**

- The Arguments are the criteria, such as the cells you are pulling data from, or the fixed values you type in (like numbers).

Functions are a type of formula, therefore they always start with an equal sign **=**

Your mandatory BFF for all formulas – the EQUAL sign.

The next component is the name of the function. After the function name comes the arguments for the function, which are always enclosed in parentheses. The arguments are the cell locations and/or values that will be used in the function. The number and type of arguments varies based on the function being used, although in this section we will only work with a range of cells for the function arguments. Here are a few common ones for statistics:

Statistical Functions

Function	Output	Structure
ABS	The absolute value of a number	=ABS(number)
AVERAGE	The average or arithmetic mean for a group of numbers	=AVERAGE(range)
AVERAGEIF	Average of a set of numbers that meet a condition	=AVERAGEIF(range, criteria, [average_range])
AVERAGEIFS	Average of a set of numbers that meet one or more conditions	AVERAGEIFS(average_range, criteria_range1, criteria1,
COUNT	The number of cell locations in a range that contain a numeric value	=COUNT(range)
COUNTA	The number of cell locations in a range that contain text or a numeric value	=COUNTA(value1, [value2], ...)
COUNTIF	Counts the number of cells within a range that meet given criteria	=COUNTIF(range, criteria)
COUNTIFS	Counts the number of cells within a range that meet multiple criteria	=COUNTIFS(criteria_range1, criteria1, [criteria_range2, criteria2]...)
MAX	The highest numeric value in a group of numbers	=MAX(range)
MEDIAN	The middle number in a group of numbers (half are higher, half are lower)	=MEDIAN(range)
MIN	The lowest numeric value in a group of	=MIN(range)
PRODUCT	Result of multiplying all the values in a range of cell locations	=PRODUCT(number1, [number2], ...)
ROUND, ROUNDUP, ROUNDDO	Rounds a number to a specified number of digits. ROUNDUP rounds up away from zero. ROUNDDOWN rounds down toward	=ROUND(number, num_digits)
SQRT	The positive square root of a number	=SQRT(number)
SUM	Total of all numeric values in a group	=SUM(range)
SUMIF	Total of all numeric values in a group based on one criteria	= SUMIF(range, criteria, [sum_range])
SUMIFS	The total of all numeric values in a group based on more than one criteria	=SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)
TIME: NOW	Returns a value of the time and date of now based on the computer's clock	=NOW()
TIME: TODAY	Returns a value of today's date based on the computer's clock	=TODAY()

Key

MedAttrib: author-generated. MS Excel Statistical Functions table.

In Excel, there are several methods for adding a function to a worksheet:

- Typing the function directly into a cell
- Using the Function Library on the ribbon
- Using the Insert Function button

ACTION: Try Me activity

We will work with a combination activities workbook, named **Ch15-Stats.xlsx**. Before you start working, go to your DataFiles folder and make a copy of the file for your Examples folder, then open that copy.

Our goal for this work is in two parts, and is shown further in the chapter.

The workbook has three sheets. The first is named **Stats**, and we can practice some of these functions unrelated to an example project. The second is named **Ihoosha**, and has a table of test scores for one of its online classes. The third is just a non-working information sheet with a table of common statistical functions you can use for your reference.

Like previous formulas and functions we've worked on, these formulas begin with the **=**

sign, to tell Excel that something is being changed and that an answer will be provided. **Note** that in some cases, the functions below may include the header row of the required table – but in others, the data part of the table, NOT the header row info, will be used.

Average Functions

Average functions are used to find the average, or arithmetic mean, of data. They are useful for looking at scores or other data that needs some kind of averaging.

Let's consider **Ch15-Stats.xlsx**'s first worksheet, named Stats. We will use data from some or all of the tables on the sheet to calculate things requested in cells B15 through B31.

- Click on cell **B15**. To get the average of the list of numbers in the *Amount table of numbers* (cells A4-A13), use the AVERAGE function: **=AVERAGE(A4:A13)**

Note that, because the table of cells A4-A13 has

been given the name tbl_Amount in the Table Design ribbon, the formula will interpret your A4:A13 instead as tbl_Amount[Amount]. This will happen in the rest of these tasks since in the Practice Worksheet all of the tables were given names in the Table Design ribbon. You can type in the cells I list, or you can select the range of data I list so that Excel picks up the range and adds it to the formula.

Click on cell **B16**. To get an average of only the numbers in the Amount table cells **A4-A13** that are over 500, we need the AVERAGEIF function, which looks for one specific criteria (greater than 500) before it can calculate.

- Type **=AVERAGEIF(A4:A13,">500")**

Click on **Cell B17**. For this we will consider another table of mixed data – the *Values table in column E*. To get an average of <u>only</u> the numbers in cells **E4-E13** fall between 55 and 1000, we need the AVERAGEIFS function, which looks in the whole one-column table for values of more than 55 and for values of under 1000 before it can calculate the answer.

- Type
  =AVERAGEIFS(E4:E13,E4:E13,">55",E4:E13,"<1000")
- **SAVE your work**.

Count Functions

Count functions are used to do counts of data locations, like the number of items in a long spreadsheet meeting some specific condition. They are different than simply using filters, because they are about looking for data in the context of other data, not just sorting or filtering cell values. The data can be in numeric or text formats.

Click on **Cell B18**. To get a count of only the numbers in *G column's Counts table* of mixed text and numeric data (cells G4-G13), use the COUNT function. It will count only the numbers, not the text.

- Type **=COUNT(G4:G13)**

Click on **Cell B19**. To get a count of the cats

in the *C column table of Items* (Cells C4-C13) – which are strings of text, not numbers – we need the COUNTA function.

- Type **=COUNTA(C4:C13)**

Now we will work with a more complex multi-column table of movie information: the Sales table of columns I-N.

Click on **Cell B20**. To get a count of Sandy's appearance in the movie Sales table – which is full of strings of text and numbers – we need the COUNTIF function. The COUNTIF needs to look for one specific criteria (Sandy's name) before it can calculate.

- Type **=COUNTIF(I4:I13,"Sandy")**

Click on **Cell B21**. To get a count of specific movies that sold for $9.99 in the Sales table, we need the COUNTIFS function. This looks for more than one specific criteria: the quantity of the films, and the price of the films) before it can calculate.

- Type

=COUNTIFS(K4:K13,">100",L4:L13,"=9.99")

· **SAVE your work.**

Sum Functions

Sum functions are used for adding data. Some of the data may need to meet specific conditions beyond just being a sum field at the end of a row or column of numbers, and a couple of more complex Sum-related functions can draw these out.

- Click on **Cell B22**. To get the SUM of the prices listed in the Sales table (including the header), use the SUM function: **=SUM(L4:L13)**

Click on **Cell B23**. To get an SUM of only the quantities of films sold by Shanon in the Sales table, we need the SUMIF function. This looks for one specific criteria (Shanon in the Salesperson column) before it can calculate her quantity of sales from the K column.

- Type **=SUMIF(I4:I13 ,"Shanon", K4:K13)**

Click on **Cell B24**. To get an SUM of only the DVDs of Good quality, we need the SUMIFS function. This looks for *more than one* specific criteria before it can calculate. It will look at the quality of the film type DVD and return a sum of the related prices from the Price column.

- Type =**SUMIFS(L4:L13,M4:M13 ,"DVD",N4:N13,"Good")**
- **SAVE your work.**

Round Functions

Round functions are simply used to present data in some form of rounding of to a specific number of digits. In math, numbers aren't just whole; calculations can take numbers to several or dozens of numbers past a decimal point, and rounding can bring this under more manageable control. This is how we get that the value of PI seems to represent 3.14, rather than 3.14159265359.

- Click on **Cell B25**. To round up the contents of cell L10 with no decimal points, type

=ROUNDUP(L10,0)

- Click on **Cell B26**. To round down the contents of cell L10 with no decimal points, type **=ROUNDDOWN(L11,0)**
- **SAVE your work.**

Value-finding Functions

Value-finding functions in statistics are about determining the placement of data – high, or low, or median placement. This can be used in determining percentiles, like in assessing salaries, scores, demographics, etc. Our example is very simple, but these formulas are designed to be used with much longer ranges of data.

- Click on **Cell B27**. To look for the minimum number that appears in the one-column Amount table, type **=MIN(A4:A13)**
- Click on **Cell B28**. To look for the maximum number that appears in the one-column Amount table, type **=MAX(A4:A13)**
- Click on **Cell B29**. To look for the median (middle-value) number that appears in the

one-column Amount table, type
=MEDIAN(A4:A13)
- **SAVE your work.**

Time Functions

While Excel offers time functions in its Header and Footer options (like in the footer the date of a document being opened), you may find a need to note a specific time or date in the content of a worksheet.

- Click on **Cell B30**. To have Excel tell us what the exact time and date of right now is, type **=NOW()**
- Click on **Cell B31**. To have Excel tell us what today's date is, type **=TODAY()**
- **SAVE your work.**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**Worksheet of Statistical functions**														
2															
3	Amount ▼		Items ▼		Values ▼		Counts ▼		Salespers ▼	Movies ▼	Quanti ▼	Price ▼	Type ▼	Qualit ▼	
4	100		Lion		Green		1		Aisha	Die Hard	223	$9.99	DVD	Good	
5	200		Tiger		iPhone		2		Aisha	Interstella	97	$12.99	BlueRay	Fair	
6	250		Jaguar		FALSE		3		Aisha	Amadeus	62	$17.99	DVD	New	
7	300		Panther		TRUE		4		Marco	The Trans	180	$9.99	VHS	New	
8	400		Cougar		22		5		Marco	The Fast a	328	$11.27	DVD	Fair	
9	550		Ocelot		57		yes		Marco	Alien	430	$14.99	VHS	Good	
10	700		Lynx		Lucky7		TRUE		Sandy	Snowpierc	114	$10.56	DVD	Good	
11	800		Pallas		1984		10		Sandy	Divergent	156	$11.54	DVD	Fair	
12	950		Housecat		Ripley		N/A		Shanon	The Famil	87	$9.99	BlueRay	New	
13	1000		Cheetah		Jambalaya		one		Shanon	It Follows	98	$18.99	DVD	Good	
14															
15	AVERAGE:	525	Averages the numbers in the table range of A4 through A13												
16	AVERAGEIF:	800	Looks at the number in the table range of A4 through A13 and averages those over 500.												
17	AVERAGEIFS	57	Gives us the number from the table range of Cells E4 through E13, which is greater than 55 and less than 1000												
18	COUNT	6	Counts the number of numbers in the table range of G4 through G13.												
19	COUNTA	10	Gives the number of text fields in the table range of C4 through C13												
20	COUNTIF	2	Counts the number of times Sandy appears in the table range of I3 through N13												
21	COUNTIFS	2	Counts the number of films with a quantity over 100 in K3 through K13 sold for $9.99 (from the table range of I3-N13.												
22	SUM	$128.30	Adds the number in Cells L4 through Cell L13												
23	SUMIF	185	Adds the number of sales made by Shanon from the table range of I3 through N13												
24	SUMIFS	39.54	Sums the prices of the DVD type of films with good quality in the table range of I3 through N13												
25	ROUNDUP	$11.00	Rounds up the number in Cell G10, without decimal point												
26	ROUNDDOWN	$11.00	Rounds down the number in Cell G10, without decimal point												
27	MIN	100	Tells us the minimum number appearing in the range of A4 through A13												
28	MAX	1000	Tells us the maximum number appearing in the range of A4 through A13												
29	MEDIAN	475	Tells us the median (middle value) number appearing in the range of A4 through A13												
30	NOW	11/13/2024 15:20	Gives us the current time and date.												
31	TODAY	11/13/2024	Gives us today's date.												
32															
33	**You can play with the other tables for more practice.**														

MedAttrib: author-generated. MS Excel Statistical Functions worksheet.

Practical Use

Let's put some of this into practical use, so that we can see some outcomes of a valid table of data. Go to the 2nd worksheet in **Ch15-Stats.xlsx** which is named *Ihoosha*. This contains a table of some student test scores, course points, and class costs. We can do some calculations in the table, and then use the worksheet-like area below to consider some Count and Values-

based functions that are relevant to this kind of data.

First, let's review the table to comprehend what is needed. There is the primary table of **cells A4-H19** called Table1, with input data, which uses the Excel Turquoise table format. There is a portion of the table with a light gray background to separate the contents from most of the values that will be calculated *with*. There is the **E column** that has a light orange background, for calculation results of Student Averages. The **F column** has a light green background for more calculations, of Weighted Averages.

NOTE: While this table has been set up with the data formats already in place, in real life you will usually need to format numbers in various columns yourself.

Let's get the average of student Latanya's three test percentages.

- Click on **cell E5**.
- Type **=AVERAGE(B5:D5)** to calculate the average of her three scores.

- Copy the results of cell **E5** down into cells **E6-E17**, so that the other student averages are also calculated.

Click on cell **F5**. Here, we need to do a complex sum of three items in one calculation. This is actually just a sum; however, we need a mixed-reference formula (some relative references for the scores, and absolute referencing for the specific test weights from row 19). These weights tell us that, regarding the importance of the tests in the student scores, test 1 and test 2 are each worth 25% of the accumulated total test points, and test 3 is worth 50% (it is likely a final exam).

- In cell **F5**, type **=SUM($B$19*B5,$C$19*C5,$D$19*D5)**

This has us add the products of Latanya's 1st test score to 1st test weight, 2nd test score to 2nd test weight, and 3rd test score to 3rd test weight. Next, let's finish off for the remaining students in the table.

- Copy the results of cell **F5** down through cells **F6–F17**.

- **SAVE your work**

Now the table is complete. Let's get to the additional worksheet fields in cells **A22 through A31**. This will allow us to gather more useful information about the students' scores and performance from their table data and calculations. The cell ranges used in this section will refer to the **actual data cells** in the table, not the header row or the grayed-out test averages/weights rows.

- In cell **B22**, calculate the Count of students. This should use a COUNTA formula (for text) and reference cells **A5 – A17**.
- In cell **B23**, calculate a count of Test 1. This should use a COUNT formula (for numbers) and reference cells **B5 – B17**.
- In cell **B24**, calculate the number of students whose Student Average was greater than 80%. This should use a COUNTIF formula and reference cells **E5 – E17**.
- In cell **B25**, calculate a count of students whose Course Points fell below 250. This should use a COUNTIF formula and

reference cells **G5 – G17.**

- In cell **B26**, calculate an average of student Course Points. This should use an AVERAGE formula and reference cells **G5 – G17**.
- In cell **B27**, calculate the minimum percent received for Test 3. This should use a MIN formula and reference cells **D5 – D17**.
- In cell **B28**, calculate the maximum percent received for Test 3. This should use a MAX formula and reference cells **D5 – D17**.
- In cell **B29**, calculate the middle percent received for Test 3. This should use a MEDIAN formula and reference cells **D5 – D17**.
- In cell **B30**, calculate the sum of the Student Costs. This should use a SUM formula and reference cells **H5 – H17**.
- In cell **B31**, calculate the sum of the Student Cost for *only* students who passed with 220 points. This should use a SUMIF formula and reference cells **G5 – G17** and cells **H5 – H17**.
- **SAVE your work** and close the file. We're finished!

	A	B	C	D	E	F	G	H
					F5	=SUM($B$19*B5,$C$19*C5,$D$19*D5)		
3	Comp202 - Office Suite Fall 2022							
4	Student	Test 1	Test 2	Test 3	Student Average	Weighted Avera	Couse Points	Student Cost
5	Ibori, Latanya	95%	89%	92%	92%	92%	270	$250.00
6	Dvořák, Ondrea	86%	79%	88%	84%	85%	255	$250.00
7	Johnsen, Ronnie	94%	88%	83%	88%	87%	199	$250.00
8	Samaras, Kyrie	63%	94%	86%	81%	82%	249	$250.00
9	Sharma, Tamia	93%	86%	85%	88%	87%	255	$250.00
10	Truong, Duc	89%	77%	50%	72%	67%	269	$250.00
11	Green, Monty	82%	78%	62%	74%	71%	235	$250.00
12	Dorie, John	91%	86%	91%	89%	90%	290	$250.00
13	Naeole, Penina	97%	91%	97%	95%	96%	298	$250.00
14	Doak, Campbell	72%	69%	72%	71%	71%	232	$250.00
15	Leon, Markos	0%	94%	0%	31%	24%	96	$250.00
16	Apone, Steve	90%	81%	90%	87%	88%	278	$250.00
17	Marková, Krista	72%	86%	72%	77%	76%	215	$250.00
18	*Test Averages*	*79%*	*84%*	*74%*	*n/a*	*n/a*	*n/a*	*n/a*
19	*Test Weights*	*25%*	*25%*	*50%*	*n/a*	*n/a*	*n/a*	*n/a*
20								
21								
22	Count of	13						
23	Count of Test 1	13						
24	Count of students who exceeded 80%	8						
25	Count of students who fell under 250 points	6						
26	Average of student course	241.62						
27	Minumum percent for test	0%						
28	Maximum percent for test	97%						
29	Median percent for text 3	85%						
30	Total Fees	$3,250.00						
31	Fees for passing students	$2,500.00						

MedAttrib: author-generated. MS Excel Statistical Functions table of test scores.

Chapter 16: Functions - Lookups / Logical

- VLOOKUP
- HLOOKUP
- XLOOKUP
- IF / nested functions

This chapter focuses mostly on lookup functions. We will also review a basic use of the IF function and a nested function.

The LOOKUP function is a built-in function in Excel that is categorized as a reference function. It can be used when you need to fill in some data in a dataset that is referenced in another dataset – in the same worksheet, another worksheet or another workbook. It isn't as simple as using the Click Cell method

to simply copy data from one place to another, because you might need to have to ask for the data to be found based on criteria in the existing dataset and where it is also referenced in another dataset. For example, you might you know the part number for a computer part in your dataset, and you need the price but your table doesn't know it because it is listed in another table or dataset.

VLOOKUP

You need to use a VLOOKUP function to look up information in a table so that you can use that information in another table that needs it. It stands for Vertical Lookup, because the data is being looked up in reference to the columns of a table, not the rows. Is the information in a table's column (default is yes, since most tables have their header rows for columns). If so, then you use a VLOOKUP.

There are four pieces of information (arguments) that you will need in order to build

the VLOOKUP formula. These are the four arguments of a VLOOKUP function:

- The **Lookup_value**, which is the value you want to look up in the table you are inputting your formula into. This would be what your calculation cell needs from its own table to look up in another dataset for the answer.
- The **Table_array** is the range (table) where the lookup values and the values you want returned by the function are located.
- The **Col_index_num**, which is the column number in the data range that contains the value (information you need) to return to your calculation cell.
- The **Range_lookup**, which is your request for an exact match (false) or approximate match (true). It is best to use **false** so that your Lookup formula is exact.

TIP: LOOKUP Columns = 2. VLOOKUPs are tricky if you try to use them for anything other than looking in two columns of a table. They are linear in processing, so you need to use them for

only 2 columns – the left column with the value that matches your Lookup_value, and the right column with the resulting data you want to be pulled over to your calculation cell. What if a lookup table has more than 2 columns? Easy! _Just make a named data range of only the two columns you need to look in_.

ACTION: Try Me activity

We will work with a combination activities workbook, named **Ch16-Lookups.xlsx**. Before you start working, go to your DataFiles folder and make a copy of the file for your Examples folder, then open that copy.

Our goal for our work has 3 parts, all of which are illustrated later in the chapter.

The workbook has two sheets; the first is named Lookups, and we can practice some of these functions with simple examples. The second is a static information sheet with some common lookup and logical functions you can use for your reference.

Go to the Lookups worksheet. On it is a table, called Movies, from cells *A5-I19* with row 5 being the header row. Look at the empty cell **D6**. This cell needs to tell us what the Genre of the movie shown in cell B6 is. All we have is a Genre Code, though, and the actual Genre name is listed in <u>another</u> small table called Genre (*Cells K6-L11*) on the same sheet. How do we get that information into cell **D6**?

Here is what needs to happen. We need to tell cell D6 to look at cell **C6** for the Genre Code. We then need to tell cell D6 to look that same Genre Code up in the Genre table of cells K6-L11, and tell us what the Genre Code in the K column represents from the L column. ***What????***

D6 should look at **C6**, then look over at **K column** for whatever genre code matches and what its associated **L column** genre name is. *Ummmm... okay.*

Let's try this:

VLOOKUP syntax:

- Calculation cell with the VLOOKUP formula = **D6**
- Lookup_value = **C6**
- Table_array = **K6 – L11** (a 2-column data range)
- Col_index_num = **2** (which is the L column in a range of cells K6-L11)
- Range_lookup = **FALSE** (which means an exact match)
- Result = **Adventure**

So, here we go:

- Click **Cell D6**.
- Type **=VLOOKUP([@GenreCode],Genre,2,FALSE)**

Genre refers to the name of the 2-column table that makes up the 2-column dataset we needed to look in.

- *Assuming your VLOOKUP worked and gave you **Adventure** in cell **D6,** IF Excel*

does not auto-populate **D7-D19** with the formula, then copy the formula of **D6** down through cells **D7-D19**.

· **SAVE your work.**

Let's try another.

Click **Cell F6**. We want this cell to show the quality of the movie product. To do this, we will need to figure out where this information is. The 2-column Quality table lists the Quality codes and their respective quality label (fair, good, new).

Let's use the function builder.

· In cell **F6**, click the FX symbol to the left of the Formula bar.

When the Function Arguments dialog box opens, do the following:

· In the Lookup_Value field, type in cell **E6**. Because this is in a named table, Excel usually interprets it as [@QualityCode] However, if Excel only reads it as E6 in the formula, that will also be fine.

- In the Table_Array, type **Quality**. OR, if you choose instead to select the cell range of N6 – O9, make sure to make the reference *ABSOLUTE* in the function builder.
- In the Col_Index_Num, type **2**, which is column 2 of the Quality Table_array we are looking in.
- In the Range_Lookup, type **FALSE**
- Click **OK**.

Function Arguments	? ×	
VLOOKUP		
Lookup_value	[@QualityCode]	= "F"
Table_array	Quality	= {"F","Fair";"G","Good";"N","New"}
Col_index_num	2	= 2
Range_lookup	FALSE	= FALSE

Looks for a value in the leftmost column of a table, and then returns a value in the same row from a column you specify. By default, the table must be sorted in an ascending order.

Range_lookup   is a logical value: to find the closest match in the first column (sorted in ascending order) = TRUE or omitted; find an exact match = FALSE.

Formula result =   Fair

Help on this function   OK   Cancel

MedAttrib: author-generated. MS Excel VLOOKUP using Function Arguments dialog.

- Then, assuming you got a correct response in cell **F6** (Fair), copy the formula of **F6** down through cells **F7-F19** if Excel does not auto-populate cells **F7-F19** for you.

Click **Cell H6**. We want this cell to show the medium that the film is being sold on. To do this, you need to figure out where this information is. The 2-column Media table lists the Media codes and their respective medium (DVD, VHS, Blu-ray).

- You know what to do. Craft a **VLOOKUP formula for H6**. You can do it by hand or use the Function Arguments builder and model your formula after what you see for the **F column**.
- Once you complete the formula accurately, copy the formula of cell **H6** down through cells **H7-H19** if Excel does not auto-populate those cells for you.
- **SAVE your work.**

MedAttrib: author-generated. MS Excel VLOOKUPs activity.

Errors

Note: What if a VLOOKUP doesn't work? What if we get a result different from the one predicted? In this case, we may have:

- Made a slight mistake entering the VLOOKUP function
- Tried to look in some other column instead of the second one in our data range
- Might not have named a data range at all if our data was in a **Table_array** that has more than 2 columns.
- The Lookup_value might not be in the **Table_array**

To make repairs in the function, click in the formula cell to activate it. In the Formula bar, press the Insert Function button. That will reopen the dialog box so you can make your repairs. Did you forget to make the cell references for the Table_array absolute (like a named data range or the $N$6:$O$9)? Did you use the wrong cell for the Lookup_value? Then, press **OK** when you are done reviewing the Function dialog box and recopy the corrected

function down through the rest of the cells in the column.

HLOOKUP

You might need to use a lookup function to look up information in a table made up of rows (not columns) so that you can use that information in another table that needs it. **HLOOKUP** stands for Horizontal Lookup, because the data is being looked up in reference to the rows of a table, not the columns. Is the information in a table's row. If so, then you use an HLOOKUP.

TIP: It is very important to specify a <u>named range</u> for the two rows you plan to look up your Lookup_Value in. AND, the named range contents – specifically the row headers, need to be EXACTLY like the columns headers of any table/range of cells you are using the Hlookup formula in. HLOOKUPS can be a little sensitive without being clear as to why.

In this example, we are working with a table called Students of cells **A24 – C29**. We want to populate the Notes column with notes listed in the range of cells **E24 – H25**, which already has a Named Rage name of **Comments**. Our common information point between the two data ranges is the number of points a student received in the Students table, and the points that a specific note falls under in the Comments range.

HLOOKUP syntax:

- Calculation cell with the HLOOKUP formula = **C25**

- Lookup_value = **B25**
- **Table_array = E24 – H25** (named Comments in the Formulas ribbon's Name manager)
- Row_index_num = **2**
- Range_lookup = **FALSE**
- Result = *On Target*

So, here we go:

- FIRST, click on cell **E24**, and *change* the word Score to the word **Points**.
- Click cell **C25**
- Type **=HLOOKUP([@Points],Comments,2)** Do not add ,false or ,true after the 2.

Comments refers to the name of the 2-row table that makes up the 2-row dataset we needed to look in.

- Copy the formula of cell **C25** down through cells **C26-C29**, assuming your HLOOKUP worked and gave you **On Target** in cell **C25**.
- HOT TIP: If for some reason your HLookup is not working correctly, <u>CHANGE</u> the word *Score* in **Cell E24** to the word *Notes*.

· **SAVE your work.**

	A	B	C	D	E	F	G	H
22								
23	**Student Status - HLOOKUP**							
24	**Student Name**	**Points**	**Notes**		**Notes**	**210**	**250**	**280**
25	Sharma , Tamia	255	On Target		Points	Needs Help	On Target	Excellent!
26	Truong , Duc	269	On Target					
27	Green, Monty	235	Needs Help					
28	Dorie, John	290	Excellent!					
29	Naeole, Penina	298	Excellent!					
30								

MedAttrib: author-generated. MS Excel HLOOKUP activity.

XLOOKUP

XLOOKUP is a fairly new lookup function in Excel, starting in 2021's version/updates to MS Excel 365. Because of this, it is not backwards compatible with earlier versions of Excel. Many students and workers find themselves in workplaces that haven't fully upgraded to current Office 365, and/or may be using other financial workbook tools from free and open-source providers.

XLOOKUP is able to search for data both horizontally and vertically while **VLOOKUP**

searches only vertically and **HLOOKUP** searches only horizontally. It searches a range or an array, and then returns the item corresponding to the first match it finds. It can be considered a more elegant function, with only 3 arguments needed in most cases because the default match mode is 0 (exact match). However, it can be less intuitive to learn because it can have additional logical arguments which make the formula seem less than intuitive for new learners.

At this time, XLOOKUP is *not* being covered in this textbook, primarily because it is not backwards compatible. This may change as the function becomes more routinely used, and easier to interpret.

IF and Nested functions

IF Function

The IF function allows you to make a logical comparison between a value and what you

expect by testing for a condition and returning a result of True or False. These decision results can be used to provide information, do different / additional calculations, and/or do further tests.

The IF function is one of the most popular functions in Excel. It allows you to make logical comparisons between a value and what you expect. In its simplest form, the IF function says something like:

IF the value in a cell is what you expect (true) – do this. If not (**else**) – do that. The IF function has three arguments:

- **Logical test** – Here, we can test to see if the value in a selected cell is what we expect. You could use something like "B7=14" or "B7>12" or "B7<6"
- **Value_if_true** – If the requirements in the logical test are met – like if B7 is equal to 14 – then it is said to be true. For this argument, you can type text – "True", or another message like "On budget!" Or you could insert a calculation, like B7*2 (If B7 does equal 14, multiply it by 2). Or, if you

want Excel to put nothing at all in the cell, type "" (two quotes).

- **Value_if_false** – If the requirements in the logical test are not met – if B7 does not equal 14 – then it is said to be false. You can enter the same instructions here as you did above. Let's say that you type the double quotes here. Then, if B7 does not equal 14, nothing will be displayed in this cell.

Nested Functions

Nested functions are when a function needs to accomplish more than one thing, and needs the help or one or more functions added inside of its code. They allow you to test more than one thing in the same calculation,

For instance, a nested IF function is an IF function within another IF function. It might refer to something like:

- **IF** this, **then** that, **else** look this up, and **IF** this, **then** that, and. . .

You get the point. It is a calculation that behaves like a flowchart of choices and results.

In **Ch16-Lookups.xlsx**, we'll continue working with the Lookups worksheet. We'll do a simple IF function, and also a little more complex but fun nested IF function.

Cells **A35 through E48** make up a table called **Gens**, including a header row. We need to do the formulas for **column C** to determine if the person in the record is an elder, and when we do the formulas for **column E** to determine if the person in the record is a GenX or Millennial, or in some other generation.

Click cell **C36**. We need to determine if Joah, who is age 26, is an elder. If his age meets certain conditions, then **yes**, Joah is an elder. If his age does not meet certain conditions, then **no**, Joah is not an elder.

Let's use the function builder.

- In cell **C36**, click the FX symbol to the left of the Formula bar.

When the Function Arguments dialog box opens, do the following:

- In the Logical_Test field, type in **B36 >64**
- In the Value_if_true, type **Yes**
- In the Value_if_false, type **No**
- **Click OK**.
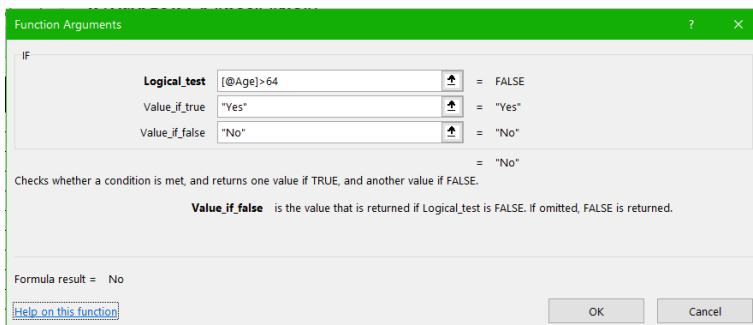
MedAttrib: author-generated. MS Excel IF activity in Function Arguments dialog.

This asks if the value of cell B36 (age 26) is greater than the age of 64. It is *not* greater, so cell C36 should return **No.**

- Copy the formula of cell **C36** down into cells **C37 – C48**. (If Excel does not auto-populate the column for you.)
- **SAVE your work.**

Now, let's find out what generation Joah is. Is he a GenXer? A Millennial? Or in some other generation? THIS is going to take sone doing, so hold on to yourself. . .

Basically, we have to ask:

If Joah's birth year falls in a certain yearly range, he is **GenX**. If it does not fall into that range, then does his birth year fall into another yearly range? If yes, he is **Millennial**. If his birth year does not fall into *that* range, then he is some **other generation**.

This calculation takes some time to figure out, because it nests functions inside each other to ask and answer those things all in one cell. Plus, we have to look at Joah's birth year in a range of dates, not just as one simple choice. This means we have to nest in AND functions, which has 2 arguments and Returns TRUE only if **both** of its arguments are TRUE.

- In cell **E36**, type **=IF(AND(D36>1965,D36<1980),"GenX",IF(AND(D36>1981,D36<1996),"Millennial","other generation"))**

If Joah's birth year in D36 is between 1965 and 1980, he is **GenX**, otherwise if his birth year in D36 is between 1981 and 1996, he is **Millennial**, otherwise he is **other generation**.

- Assuming that the function is satisfied that Joah is **other generation** (birth year 1997), we're good.
- If Excel does not auto-populate the column for you, copy the formula in **E36** down through cells **E37 – E48**.
- **SAVE your work**, and close the file. We're done!

	A	B	C	D	E	
31						
32						
33	**IF, Nested - LOGICAL**					cr
34						
35	**Name**	**Age**	**Elder**	**Birth year**	**Generation**	
36	Joah	26	No	1997	other generation	
37	Trinity	32	No	1991	Millennial	
38	Scott	74	Yes	1949	other generation	
39	Mei	19	No	2004	other generation	
40	Zinnea	55	No	1968	GenX	
41	Michael	39	No	1984	Millennial	
42	Julio	64	No	1959	other generation	
43	Viveca	69	Yes	1954	other generation	
44	Gina	12	No	2011	other generation	
45	Jai	26	No	1997	other generation	
46	Toshio	45	No	1978	GenX	
47	Najwa	82	Yes	1941	other generation	
48	Anatoly	31	No	1992	Millennial	
49						
50						
51						
52						

Lookups | Table of Functions | ⊕

MedAttrib: author-generated. MS Excel IF and nested activities.

Chapter 17: Functions - Financial

- Fundamentals of Loans
- PMT Function
- PPMT Function

In this chapter, we'll work through a couple of basic financial functions in order to determine the payments and other conditions on a loan. Excel has a lot of financial functions, most of which are specialized to accounting and for loans, annuities, stocks, and other high-value skill areas. The loan-related functions are perhaps the simplest to use on a personal and general workplace support environment.

Fundamentals of Loans

A loan is a contractual agreement in which money is borrowed from a lender and paid back over a specific period of time. The amount of money that is borrowed from the lender is called the **principal** of the loan. The borrower is usually required to pay the principal of the loan plus **interest**. When you borrow money to buy a house, the loan is referred to as a **mortgage**. This is because the property being purchased also serves as **collateral** to ensure payment. In other words, the bank can take possession of your house if you fail to make loan payments.

Term	Definition
Collateral	Any item of value that is used to secure a loan to ensure payments to the lender
Down Payment	The amount of cash paid toward the purchase of a house. If you are paying 20% down, you are paying 20% of the cost of the house in cash and are borrowing the rest from a lender.
Interest Rate	The interest that is charged to the borrower as a cost for borrowing money
Length	The amount of time you have to repay a loan
Mortgage	A loan where property is put up for collateral
Principal	The amount of money that has been borrowed
Residual Value	The estimated selling price of a vehicle at a future point in time

MedAttrib: author-generated. Table of loan terms.

A lender is required by law to provide borrowers with an amortization table when a loan

contract is offered. Each time a payment is made on the loan, you are paying the bank an interest fee plus some of the loan principal. Each year the amount of interest paid to the bank decreases and the amount of money used to pay off the principal increases. This is because the bank is charging you interest on the amount of principal that has not been paid. As you pay off the principal, the interest rate is applied to a lower number, which reduces your interest charges.

PMT Function

The PMT function refers to payment. In Excel, loan payments are calculated through the PMT (payment) function. This function is more complex than the statistical functions covered in Section 2.2 "Statistical Functions". With statistical functions, you are required to add only a range of cells or selected cells within the parentheses of the function, also known as the argument. With the PMT function, you must accurately define a series of arguments

in order for the function to produce a reliable output.

Table 2.6 Arguments for the PMT Function

Key Terms	
Basis:	The type of day count basis to use.
Frequency:	The number of coupon payments per year
fv:	The future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0
Guess:	(Optional argument) - Guess of what the interest rate should be, to provide a start point for the RATE function
Maturity:	A security's maturity date, when the security expires.
nper:	The total number of payment periods in an annuity.
Pmt:	The payment made each period; it cannot change over the life of the annuity.
pv:	The present value, or the lump-sum amount that a series of future payments is worth right now. If omitted, it is assumed to be 0 (zero)
Rate:	The interest rate per period
Redemption:	A security's redemption value per $100 face value.
Settlement:	A security's settlement date, and is after the issue date when the security is traded to the buyer.
Type:	The number 0 or 1 and indicates when payments are due. If type is omitted, it is assumed to be 0.

MedAttrib: author-generated. Table of PMT function arguments.

NOTE: by default, the result of the PMT function in Excel is shown as a negative number. This is because it represents an outgoing payment – something owed. To do this, you can place a negative sign between the equal sign and the function name PMT. Excel has other formats for negative numbers, like the number within parentheses, and/or the number shown in red.

When working with more complex functions such as the PMT, it is easiest to use the Function Dialog box. Use cell references for the arguments of the PMT function whenever possible. This will allow you the flexibility to

change aspects of the loan and have the payment automatically recalculate.

We will work with a combination activities workbook, named **Ch17-Finance.xlsx**. Before you start working, go to your DataFiles folder and make a copy of the file for your Examples folder, then open that copy. Here is what we are aiming for. The red numbers in parentheses are one of Excel's formats for negative (or in this case, owed) numbers.

	A	B	C	D
1	**Taste du Monde**			
2				
3				
4	**PMT, PPMT**		**Shipping Warehouse**	**Vehicle Payments**
5	Quoted interest rate per year		7.79%	5.20%
6	Monthly interest		0.65%	0.43%
7	Amortization period in years		18	4
8	Nper		216	48
9	Principal amount to be borrowed	$	2,250,000	$ 22,000
10				
11	Monthly loan payment		($19,401.86)	($508.64)
12				
13	Principal portion of first loan payment		($4,795.61)	($413.31)
14	Principal portion of last loan payment		($19,276.72)	($506.45)
15				
16	Total cost of loan		($4,190,801.39)	($24,414.72)

MedAttrib: author-generated. MS Excel loan activity.

The workbook has two sheets. The first is named LoanRepay, with a building loan, and a car loan. The second is an information sheet with a table of common financial functions you can use for your reference.

In the LoanRepay sheet, Taste du Monde has

a loan for a shipping warehouse project, and a loan for a delivery vehicle.

The areas to be calculated are cells that have a background color:

- Light tan for the Warehouse loan in column C.
- Light green for the Vehicle loan in column D.

Let's work on the warehouse loan first; it is the left-hand loan in the worksheet, ranging from cells **C6 through C16**.

The loan is for $2,250,000. It is for an expected 18 years (amortization). The interest it was taken for is 7.79%.

Our job is to determine the:

- Monthly loan payment
- Amount of loan principal the monthly payment is applied to at the beginning of the loan repayment (first month)
- Amount of loan principal the monthly payment is applied to at the end of the loan repayment (last month of 18 years)

- Total cost of the loan.

In calculating this data, we will have to calculate a few other things in order for the actual loan payment information to be able to be calculated correctly. This includes the:

- Monthly percentage rate of the annual interest rate (Monthly Interest)
- The number of months in the amortization period of 18 years (Nper)

This feels like a story problem. Ugh. Sorry.

Click on **Cell C6**. This is a simple calculation that doesn't need the Function Arguments dialog, just a basic formula. This will give us the *monthly interest rate* from the annual one.

- In cell C6, type **=C5/12**
- AFTER you do this, change the data format of Cell C6 to **Percentage** using the Home Ribbon Number Group dropdown and choosing **Percentage,** then **2 decimal points**.

Click on cell **C8**. This is also a simple calculation that doesn't need the Function Arguments dialog. This will give us the number of months occurring in 18 years.

- In cell C8, type **=C7*12**

Now we have components to work on our PMT function. The cell F9 already provides the **Pv** (principle to be borrowed).

- Click on Cell C11 (for *Monthly Loan Payment*), and use the FX symbol to the left of the formula bar to open the **Insert Function dialog box**.

- In the search, type **PMT** and click GO.
- Select **PMT** and click OK.
- In the Function Arguments dialog box, add:
- Rate = cell **C6**
- Nper = cell **C8**
- Pv = Cell **C9**
- Ignore the Fv and the Type fields, since they are optional (you can tell because they are formatted in lighter gray).
- Click **OK**.

Function Arguments	? ✕
PMT	
Rate	C6 ⬆ = 0.006491667
Nper	C8 ⬆ = 216
Pv	C9 ⬆ = 2250000
Fv	⬆ = number
Type	⬆ = number
	= -19401.85826

Calculates the payment for a loan based on constant payments and a constant interest rate.

Pv is the present value: the total amount that a series of future payments is worth now.

Formula result = ($19,401.86)

Help on this function   OK   Cancel
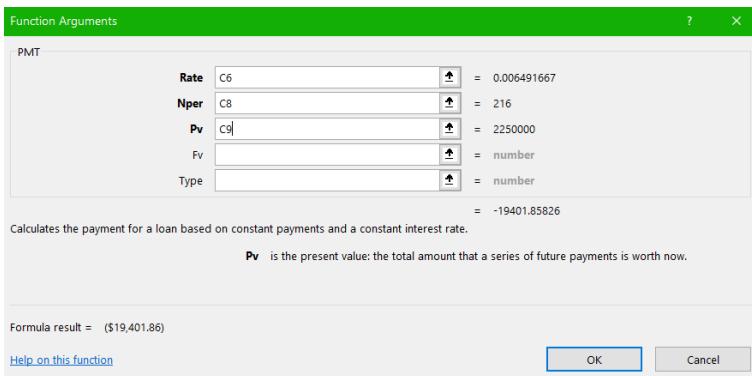
MedAttrib: author-generated. MS Excel Function Arguments dialog for PMT.

A number will populate Cell C11; it should be **$19,401.86**. This cell has already been formatted to show the number as a negative (a cost in

repaying the loan, not revenue from a salary or bonus). This particular negative number format comes out as the number appearing in parentheses, and in red.

This is the monthly payment (PMT) for the loan under the terms of the interest and the 18 year repayment plan.

- **SAVE your work**.

PPMT Function

The **PPMT** function gives you the *payment on the principal loan amount (Pv)* for a given period, for an investment based on periodic constant payments and a constant interest rate. The principal amount will change over time, since the longer a loan is paid, the more of it will go to the principal and less to the interest.

In this activity, we'll look at the payment on principal for the first month, then for the last month, of the 18-year loan period.

Click on cell **C13**. This is the very first month the loan will be paid, and most of the payment will apply to the interest. Our question is how much will be applied to the actual loan itself (the principal – Pv – of the $2,250,000)?

- Click on cell **C13**, and use the FX symbol to the left of the formula bar to open the **Insert Function dialog box**.
- In the search, type **PPMT** and click GO.
- Select **PPMT** and click OK.
- In the Function Arguments dialog box, add:
- Rate = cell **C6**
- Per = **1**
- Nper = cell **C8**
- Pv = cell **C9**
- Ignore the Fv field, since it is optional.
- Click **OK**.

A number will populate cell **C13**; it should be **($4,795.61)** in red. This is how much of the monthly loan payment $19,401.86 (the *Nper*) in Month 1 (the *Per*) will be applied to the $2,250,000 (the *Pv*) loan amount; the rest will go to what is left of the interest.

Function Arguments ? ✕

PPMT

Rate	C6	⬆	=	0.006491667
Per	1	⬆	=	1
Nper	C8	⬆	=	216
Pv	C9|	⬆	=	2250000
Fv		⬆	=	number

= -4795.608264

Returns the payment on the principal for a given investment based on periodic, constant payments and a constant interest rate.

Pv is the present value: the total amount that a series of future payments is worth now.

Formula result = ($4,795.61)

Help on this function   OK   Cancel
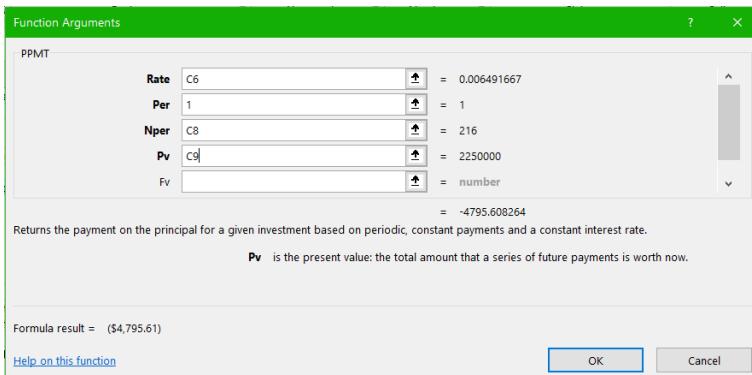
MedAttrib: author-generated. MS Excel Function Arguments dialog for PPMT.

Now, let's look at the same thing for the final month of the loan (*month 216 from cell C8*).

- Click on cell **C14**, and use the FX symbol to the left of the formula bar to open the Insert Function dialog box.
- In the search results select **PPMT** and click OK.
- In the Function Arguments dialog box, add:
- Rate = cell **C6**
- Per = **216**
- Nper = cell **C8**
- Pv = Cell **C9**
- Ignore the Fv field, since it is optional.

- Click **OK**.

A number will populate cell **C11**; it should be **($19,276.72)** in red. This is how much of the $19,401.86 (the *Nper*) in the final Month 216 (the *Per*) will be applied to the $2,250,000 (the *Pv*) loan amount. Most of it!

Now, let's figure out how 18 years of paying the monthly loan will actually cost. We don't need the Function Argument dialog for this; we are calculating the monthly loan payment by amortization years (18 years)

- Click on cell **C16**, and type **=C11*C8**

This is the monthly loan payment of $19,401.86 over 216 months (the *nPer*), and the total comes to a whopping ($4,190,801.39) in red.

- **SAVE your work**.

More Practice

Let's find out if we get better terms and results for the delivery vehicle. It is the right-hand loan

in the worksheet, ranging from **Cells D6 through D16**.

The loan is for $22,000. It is for an expected 4 years (amortization). The interest it was taken for is 5.20%.

- In cell **D6**, type **=D5/12**, then *format the answer* as Percentage with 2 decimal points)
- In cell **D8** type **=D7*12**
- In cell **D11**, the formula – after using the Function Argument dialog – should come out as **=PMT(D6,D8,D9)**
- In cell **D13**, the formula, after using the Function Argument dialog, should come out as **=PPMT(D6,1,D8,D9)**
- In cell **D14**, you can practice calculating it based on what you learned from calculating cell C14 for the Warehouse loan.
- In cell **D16**, you can practice calculating it based on what you learned from calculating cell C16 for the Warehouse loan.
- **SAVE your work**. We're finished!

Part 5: Summarizing Data

In a way, Excel is a tool for summarizing data from other sources, such as big data imported from external databases, or regular infusions of data entry from customers and paperwork. While Excel can be and is used to craft new spreadsheets, it is as much about compiling, interpreting, cleaning, and preparing data for analysis, which is a form of some summarizing. However, It isn't surprising that this data management program also needs to be able to crunch data further – to summarize it in different was so that data can be reviewed, tightened, and examined for trends and connections. This includes using Pivot tables and summary tables.

Chapter 18: Pivot Tables

- Pivot Tables Concepts
- Creating Pivot Tables
- Formatting Pivot Tables
- Pivot Charts
- Pivot a Pivot Table
- Slicers for Pivot Tables
- More about Pivot Charts

Pivot Tables Concepts

A way to analyze table information is with Pivot tables. A Pivot table is a powerful tool that calculates, summarizes, and analyzes table data to compare, patterns, and trends. It is not the same as a simple dataset or a basic Excel Table Object (basic table) like we have been

using for general capture and organizing of data. Pivot tables are inserted directly from the contents in a dataset/basic table, linking to the table object's data but using a summary table format while the original dataset/basic table remains unchanged.

Generally speaking, when you pivot on the original dataset/basic table data (or a simple dataset) you are reorganizing the pivot table information to reveal different levels of detail. This allows you to analyze specific subgroups of information and summarize data quickly and easily without having to change the structure or layout of the original dataset/basic table.

When you pull data into a Pivot table there are four main area fields: Rows, Columns, Values, and Filters. The **Rows/Legends** and **Columns/ Axis** fields can interchange quickly to summarize the data in different ways or to run new reports based on the question or criteria being asked.

ODDITY NOTE: *In the quarter between when this book was written and then had more editing done, the PivotTable Fields panel's*

*drag and drop fields seems to have changed. They used to read Rows, and Columns, (**and in some files they still DO!**) In other files they now read **Axis (Categories) and Legend (Series)**. <u>The author is not currently able to determine why this is happening and why it is not consistent. Terefore,</u> the book will refer to **Columns/Axis (Categories)** and **Rows/ Legend (Series)** to capture both. It seems that One also used to be able to create a blank Pivot table with no existing data (yet), then assign the data cell range, but now Excel requires the input of specific dataset/table cells in advance. It is useful to note this because Microsoft/the Excel program makes occasional changes to the UI and tools' layouts due to being an online Software as a Service (SaaS)..*

The Value field is data from the table that can be calculated (like money amounts), or that contain values that the Pivot table will be able to summarize. The Values field has multiple settings to choose how you want to calculate the data: SUM, COUNT, AVERAGE, MIN, MAX. This field can even show the displayed values

as a percentage of the total, column total, grand total, and so on.

Lastly, in the Filters area, which restricts the Pivot table to only show the values matching specified criteria.

Four Primary Pivot table Areas:

Rows Rows/Legend (Series)	• Displays category values from one or more fields arranged in separate rows
Columns Columns/Axis (Categories)	• Displays categories from one or more fields arranged in separate columns
Values	• Displays summary statistics for one or more fields at each intersection of each row and column category
Filters	• Contains a filter button that limits the PivotTable to only those values matching specified criteria

MedAttrib: Beginning to Intermediate Excel. MS Excel – Four Primary Pivot table Areas.

The point of a Pivot table is **not** to create new data, but to have a streamlined tool to filter and sort a summary of a larger dataset or basic table's information in different ways for different chart and analysis focus.

Creating Pivot Tables

Let's now work with an Excel file: **Ch18–Pivots.xlsx**. This is a dataset from Taste du Monde of products and their prices.

Example images of this activity appear in more than one part within this chapter.

Save a copy of **Ch18–Pivots.xlsx** to your Examples folder, then, open the copy file for work. There is one worksheet with a dataset in it. The dataset has not been converted to an Excel Table Object (basic table) and does not need to be for this task. The theme, color palette have already been set.

- Click the **Sales** sheet. Click anywhere in the dataset area. To create a Pivot table, the dataset needs to be active first, since this data is pulled into the Pivot table for summarizing options.
- From the **Insert** tab, choose **Pivot table**. In the dialog box that opens, you can see that

Excel already selected the dataset area of cells.

- From the Create Pivot table dialogue box, make sure the Pivot table report will be placed in a **New Worksheet**, and click **OK**.

PivotTable from table or range   ?   ✕

Select a table or range

Table/Range: Sales!$A$6:$G$118

Choose where you want the PivotTable to be placed

◉ New Worksheet

○ Existing Worksheet

Location:

Choose whether you want to analyze multiple tables

☐ Add this data to the Data Model

OK   Cancel
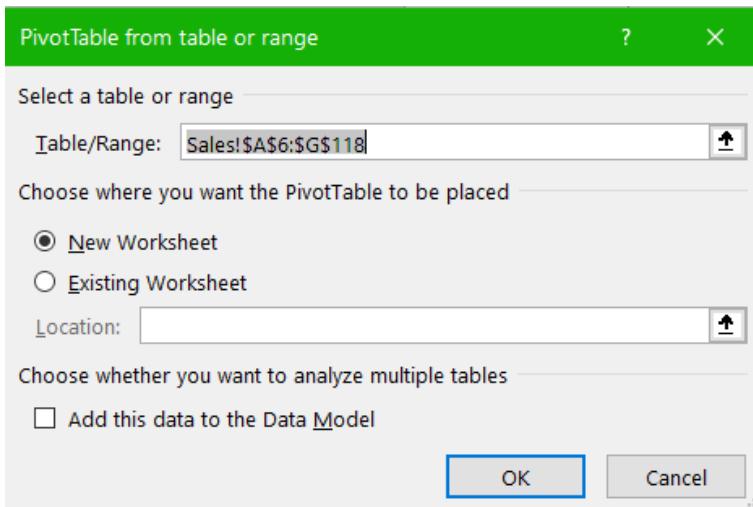
MedAttrib: author-generated. MS Excel Create Pivot Table dialogue box.

- Notice a new sheet (Sheet1) is inserted before the existing Sales sheet. It contains the Pivot table1 area and fields dialogue box. Rename the default name (Sheet 1) to **RegionSales**.
- Move the **RegionSales** sheet to *follow* the

Sales sheet.
- Note which cell is the <u>top left cell</u> of the inserted Pivot table in **your** file. In **my** Excel experience/example it was cell **A3**. If yours is A2 or A4 or another A cell, then note and work with that basis when following the instructions below for the cell references for the example, and adjust for that. Or, you can remove/add rows to your workbook so that your RegionSales sheet's Pivot table "starts" at cell **A3**. Dealer's choice!
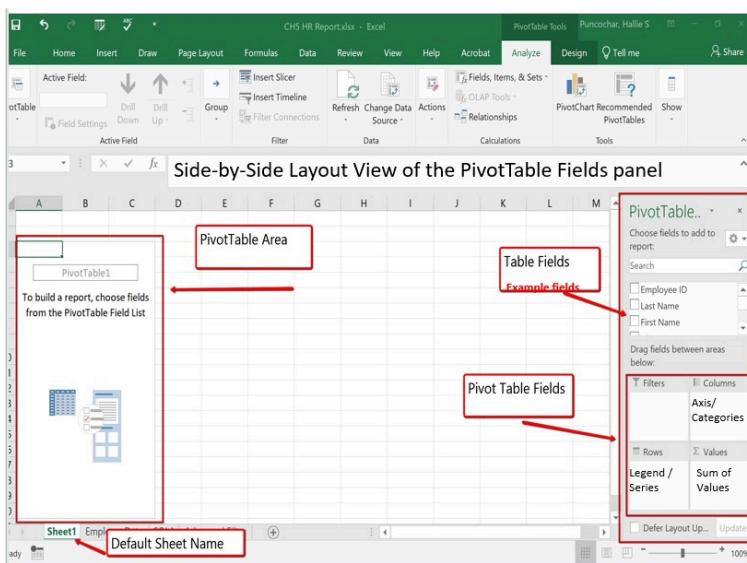
MedAttrib: Beginning to Intermediate Excel. Empty MS Excel Pivot Table Field pane.

When you first create a Pivot table to work on, Excel's default is to also open a **PivotTable Fields panel**. This is an interface you can use for moving data around so that the Pivot table itself updates with rows and columns of information. This panel can have more than one layout – this chapter will demonstrate the *side-by-side* layout.

TIP: PivotTable Fields panel. The panel will appear and disappear from view when you click outside the active Pivot table. If you actually close the panel while working IN the Pivot table and then need the panel back, clicking in the pivot table will <u>not</u> automatically return it. You can get it back from the contextual PivotTable Analyze tab, the Show icon at the left, and choose Field List from the dropdown list. ALSO, the PivotTable Fields panel may show items vertically like in the example image above, or in a side-by-side format instead; both are effective.

- From the PivotTable Fields pane, drag and drop the **Region** heading to the ***Rows/ Legend (Series)*** section of pane's Pivot table fields area. This would be the *Rows*.
- From the PivotTable Fields pane, drag and drop the **Category** heading to the ***Columns/Axis (Categories)*** field section. Notice the categories display. This would be the *Columns*.
- From the PivotTable Fields pane, drag and drop the **Sales** heading to the **Values**

section. There, it will read as *Sum of Sales* (the default).
- **SAVE your work**.
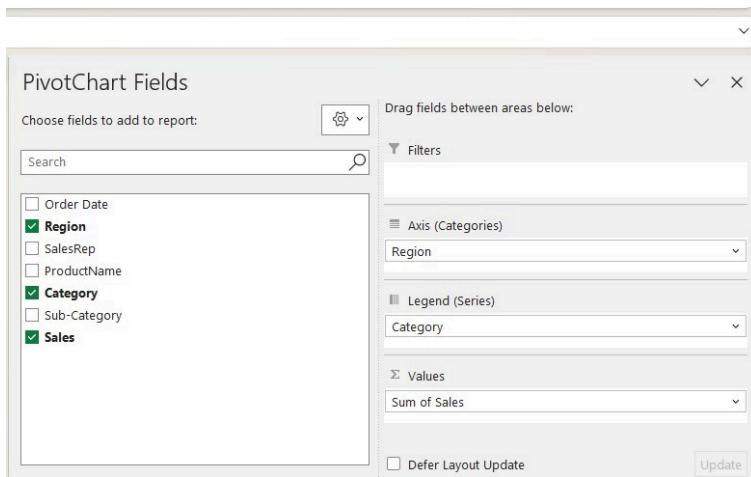
MedAttrib: author-generated. MS Excel Pivot table result and Fields panel.

What are we observing? (*See ODDITY NOTE above*)

- The ***Rows/Legend (Series)***are the row headings, for the regions.
- The ***Columns/Axis (Categories)*** are the column headings for the categories of the products sold
- The data in the cells is a summarization of

the sums of what was sold.

- A default Grand Total column shows the totals of each row.
- A default Grand Total row shows the totals of each column.

This table can be filtered to show specific categories, or specific regions. And, using the PivotTable Fields panel, it can "pivot" to other areas of focus for different row and column headings to summarize and analyze different data. *THAT is what <u>pivot</u> means in Pivot table*.

Let's Pivot Filter the table's data a bit, just temporarily.

- Click the Filter button in cell **A4**, and in the dropdown, deselect everything.
- Then select only the items in the list with **West** in them, and click OK. The Pivot table will filter the other regions out.
- Click the Filter button in cell **A4**, and in the dropdown, **Select all**., so that the table goes back the way it was.

Formatting Pivot Tables

After creating a Pivot table and adding the fields that you want to analyze, you will need to do some clean-up for the table to make sense. Sometimes the row or category headers don't really state what you need, or the filter options in the pivot table's subhead row seem confusing. You will likely need to also use some kind of data formatting for the content, since the pivot table info grabs the *information*, but <u>not</u> the numeric data <u>formatting</u> from the original dataset/basic table. You may also want to enhance the report to include slicers, or graphs for easier filtering.

- Click in the Pivot table area to activate it, to get access to a contextual Ribbon tab on the ribbon. This will contain a PivotTable **Analyze** tab and related **Design** tab.

The **Analyze** tab contains tools specifically for examining data. For example, it has the location for re-opening the PivotTables Fields panel, and the commands to insert Slicers, or illustrative Pivot charts. The **Design** tab

contains tools that specifically tie to how the table (and charts) and data visibly <u>display</u>, sort of like the basic Table tab does for regular tables. For example, when you have a lot of data in your Pivot table, it may help to show banded rows or columns for easy scanning or to highlight important data to make it stand out. You will also need to add data formatting like currency, percentage, decimals, and other related types of data formatting to make it more readable.

NOTE: Interestingly, neither Pivot table-generated contextual ribbon/tab offers to option to change the Pivot table's name. You can do this by clicking into the Pivot table to activate it, then right-clicking and selecting PivotTable Options from the dropdown list. That opens a PivotTable Options dialog window that has a space to change the Pivot table's name and do all sorts of other things, like adding AltText (for screen readers to access), and showing or hiding Grand Totals for columns and rows.

Let's clean up our Pivot table's content.

- Right-click in the Pivot table, select the PivotTable Options from the dropdown list, and in the resulting PivotTable Options dialog window, change the table's name to **Category Sales by Region**.

  ◦ Click cell **B3** and look at the Active Field contents in the PivotTable **Analyze** tab. It reads Category, while the Table's cell reads Column Labels.

- Overwrite cell **B3** with the word **Category**. This will help make using the row's filter to work with the data mean something.
- Click cell **A4,** and do the same thing to observe the Active Field contents in the PivotTable Analyze tab.
- Overtype cell **A4** with **Region**.
- Right-click on Cell **B5**, and choose Number Format, then Accounting. ALL the number cells in the Pivot table convert to Accounting format, but this can look busy. Ideally, only the first row and the total row should show the Accounting format.
- Undo the last step with CTRL Z (Mac CMD Z). If you can't, you can instead Right-click on Cell B5, and choose **General Format**.
- Select **Cells B5-F5**, and apply the

Accounting format to only them using the Home ribbon Number group's Accounting format.

- Select Cells **B6-F15** and apply the **Number format** if the data does not already appear in number format.
- IF the format is not already at 2 decimal places, select Cells **B6-B15**, choose Home ribbon's Number group, then apply the **Increase Decimal by 2**.
- In cells **B16-F16**, apply the **Accounting format** to only them, with **2 decimal points**.

TIP: Summarizing and giving data values. You can right-click on any data cell in a Pivot table, and see various ways to summarize the data and to show those values (not format, but other actual value types. These will make more sense as you work with data in your career and determine the needs and what you want your pivot tables to do.
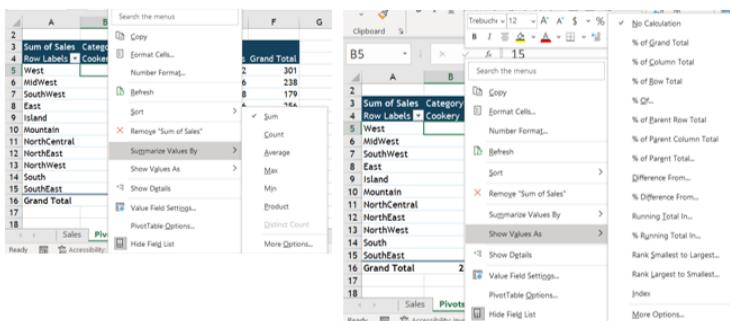
MedAttrib: author-generated. MS Excel Pivot table data format and value options.

Now that our Pivot table is more readable, let's format the Pivot table itself. Taste du Monde uses a dark teal, a light green, and a tan as some of the signature colors and this file has already been set with the Berlin Theme with

Aspect color palette. We want the table to be easy to read.

- Click in the Pivot table, then go to the Pivot table's **Design tab**.
- In the pivot table Styles gallery select the **Tan, Pivot Style Medium 21 format.**
- **SAVE your work**.

Pivot Charts

Next, let's create a pivot chart from this pivot table. The process is very similar to what we will learn later for regular charts and graphs.

- Click in the pivot table, then go the **PivotTable Analyze tab**.
- Choose the **PivotChart button** on the ribbon.
- From the listed chart types, choose Column and select the **Clustered Column** option. Click **OK**.
- Drag the pivot chart to the right so that it is not overlapping the table.
- To change the clustered style to another

variation, click the chart, then on the Pivot chart Design ribbon. HERE, choose **Change Chart Type**, and select **Clustered 3D Column**.

Notice that when you click in the Pivot chart, an *additional 3rd* Pivot table contextual tab appears to the right of the Design one, called **Format**. This allows you to do micro formatting on the Pivot chart elements, like you would with other graphics in Excel.

Also, notice that (if you had the PivotTable Fields panel open) the PivotTable Fields panel now reads Pivot**Charts** Fields.
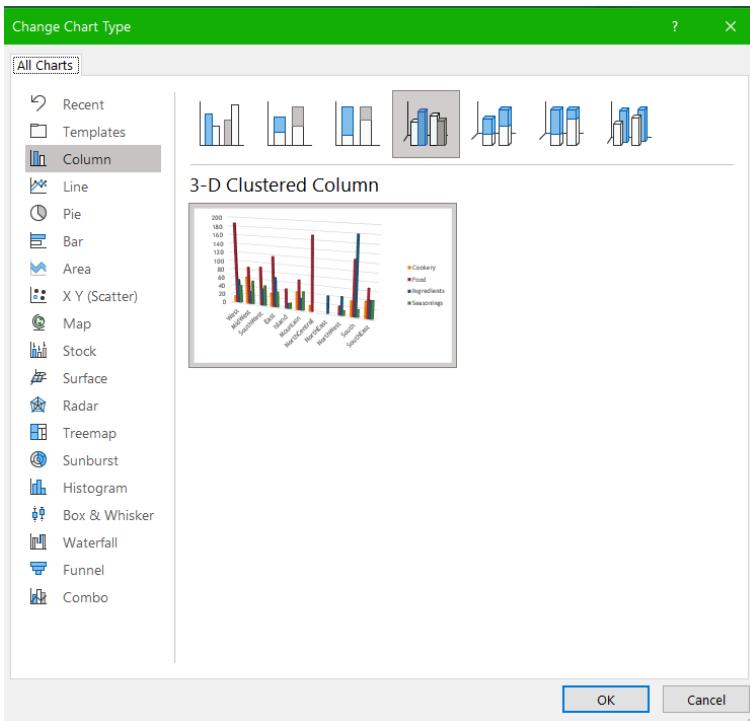
MedAttrib: author-generated. MS Excel 3D Clustered Column pivot chart.
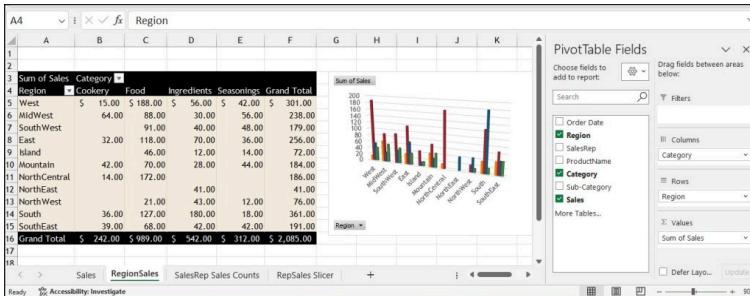
MedAttrib: author-generated. MS Excel RegionSales Pivot table and chart sheet.

Now, let's filter something in the Pivot **table**, and observe what might happen to the related *chart*.

- Click cell **B3's** Category filter button. From the dropdown, <u>deselect</u> Ingredients and Seasonings, then click **OK**.
- The table now summarizes only Food and Cookery, and the related Pivot chart adjusts automatically to focus on those as well.
- Click the Filter button in cell **B3**, and in the dropdown, **Select all**, so that the table goes back the way it was.
- **SAVE your work**.

Pivot a Pivot Table

Let's keep this table and chart as is, and make a *copy of the worksheet* so we can try some other things with the table while leaving this RegionSales worksheet one intact.

- Right-click the RegionSales worksheet tab, choose **Move or Copy**, then checkmark the **Copy checkbox**.
- Keep the sheet in the same workbook and choose **(move to end)**, then click **OK**.
- Name the new sheet **SalesRep Sales Counts**.
- **Delete the pivot chart** so that we only have the Pivot table.
- If the PivotChart Field List is no longer open on your screen, go to the contextual PivotTable Analyze tab, **Show** icon at the left, and choose **Field List** to open it.
- In the Field List, **uncheck** Region and choose **SalesRep**.
- Keep the SalesReps in the *Rows/Legend (Series)* field.
- Keep the Category in the *Columns/Axis (Categories)* field.
- In the Values field, click the dropdown arrow, and choose Value Field Settings.
- In the Value_Field Settings, choose **Count**, instead of Sum, and give it the name **SalesCount** in the Custom Name field. Click **OK**.

Now you can see the Pivot table has _pivoted_ to give different information. The numbers are counts of the number of items sold, not the price that was paid. The counts are attributed to the Sales Reps responsible for the region the products were purchased from.

There is a little problem, however. Consider cell **A4**, which reads _Region_. We had manually typed that in for the RegionSales worksheet's Pivot table because the default phrase there was too general. However, in **this** worksheet's newly pivoted table, _that label no longer applies._

Look in the PivotTable Analyze tab's Active field, and notice that it reads SalesRep. Overtype SalesRep into cell **A4**.

- Close the PivotChart Field List to make viewing room for the table.

This time let's see if we can make a Pie Chart.

- Make sure you click into the Pivot table so it is active and shows the Pivot-related Ribbon tabs.

- Choose the **PivotChart** button on the PivotTable Analyze ribbon.
- From the listed chart types, select the **Pie Chart** option. Click **OK**.
- Click the newly created chart, and in the chart's contextual Design tab, choose **Style 1** from the Chart Styles.
- Drag the Pivot chart to the right so that it is not overlapping the table.
- The Pie Chart looks nice, but it refers to only Cookery. A Pie Chart can really only view one **3D** column at a time, but the pivot chart allows you to filter it with the small Category Button in its lower left corner.
- Click the pivot chart's category button dropdown, and deselect all. Then choose only **Ingredients**. The pivot chart will change.
- **SAVE your work.**
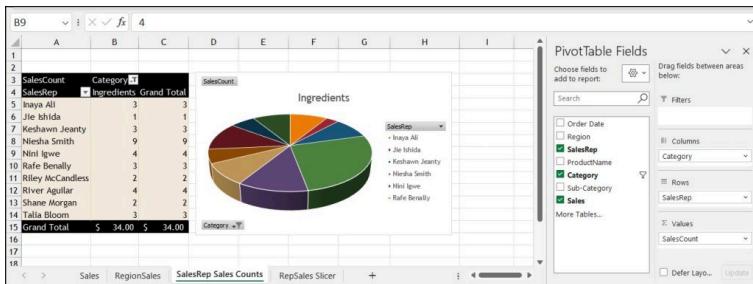
MedAttrib: author-generated. MS Excel SalesRep Sales pivot table and chart sheet.

Slicers for Pivot Tables

One of the strengths of pivot tables is that you can ask questions of the data by using filters. Being able to identify and examine subgroups is a useful analytical tool; however, when using basic table and chart filters and autofilters, the user cannot always tell which subgroups have the filters and autofilters selected without clicking tiny and not very informative filter

buttons. **Slicers** are easy-to-see buttons that you can add to your worksheet, and can click to filter the data in pivot tables and pivot charts to make the data easier to filter and interpret. With slicers, the subgroups are immediately identifiable and can be changed with a click of a button or buttons.

Why use slicers rather than row, column, or report filters? One effective way to analyze data is to use slicers to filter the data in more than one field at a time. They offer the following advantages over filtering directly in a pivot table:

- In a Pivot table, you use the filter button to specify how to filter the data, which involves a few steps. After you create a slicer, you can perform this same filtering task in one step.
- You can filter only one pivot table at a time, whereas you can connect slicers to more than one pivot table to filter data (advanced)
- Excel treats slicers as graphic objects, which means you can move, resize, and format them as you can any other graphic

object. As graphic objects, they invite interaction.

· Slicers are intuitive—users without knowledge of Excel can use them to interact with the data without getting into the Pivot table, Pivot chart, or basic Excel table object.

· Slicers make it easy for users to understand exactly what is shown in a filtered Pivot table or Pivot chart.

Let's add slicers to a Pivot table. We will do this with the **SalesRep SalesCounts worksheet** and related Pivot table; with no Pivot chart the single-minded Pie chart filtering doesn't respond well to Slider filter selections.

· Right-click the **SalesRep SalesCounts worksheet** tab, choose Move or Copy, then checkmark the **Copy checkbox**.

· Keep the sheet in the same workbook and checkmark (**move to end**), then click **OK**.

· Name the new sheet **RepSales Slicers**.

· **Delete the existing Pivot chart** so that we only have the Pivot table.

· If the PivotChart Field List is no longer

open on your screen, go to the contextual PivotTable Analyze tab, **Show** icon at the left, and choose **Field List** to open it.

- Click on the Pivot table to Activate it, and in the PivotTable Fields panel, uncheck Region and choose **SalesRep**.
- Keep the **SalesReps** in the *Rows/Legend (Series)* field.
- In the *Columns* field make sure to select **Category**.
- In the *Values* field, make sure to choose **Sum**, which makes sure that the balue of the table are for dollars.
- Change the contents of cell **A4** to read **SalesRep**.
- Click on the Pivot table, and go to the PivotTable Analyze ribbon **Filter group**.
- Click on the Filter group's **Insert Slicer** icon.
- In the Insert Sliders panel, choose only **SalesRep** and **Category**, then click **OK**.
- Two Slicer objects will appear near your pivot table, and will have all slicer buttons In them already selected.
- You can move one or both of these Slicer objects so they are to the right of your

Pivot table, and easy to see.
- In the SalesRep slicer, deselect everyone but **Talia Bloom** (you may have to scroll).
- In the Category slicer, select only **Ingredients** and **Seasonings**.
- The Pivot table contents will change to show only Talia Bloom's counts for Ingredients and Seasonings.
- In the SalesRep slicer, add **Rafe Benally**, and observe how the pivot table changes.
- In the Grand Total row, make sure to format the values as **Accounting**.
- **SAVE your work.** We are finished with this activity!

MedAttrib: author-generated. MS Excel pivot slicers that have been filtered.

If you decide to create a Pivot chart off of this Pivot table, 1) don't select Pie chart, and 2) any

changes in the Slicers will affect both the Pivot table and its Pivot chart.

More About Pivot Charts

If you need to make a change to the underlying data for a Pivot chart, you can click the Change Data Source button (PivotChart Analyze ribbon Data group. You also can refresh Pivot chart data after the change by clicking the Refresh button on the same ribbon.

As you have seen, Excel automatically creates a legend when you create a Pivot chart. The legend is from the fields in the Values area of the PivotChart Field panel. To move the legend in a Pivot chart, right-click the legend and then click Format Legend on the shortcut menu. The Format Legend pane will display options for placing the legend at various locations in the Pivot chart area.

As with tables and pivot tables, you can filter the data in a Pivot chart. Slicers used to filter a Pivot table will affect the related Pivot chart

once you refresh the chart. Otherwise, any fields in the **Columns/Axis (Categories)** area of the PivotChart Field panel display as filter buttons in the lower-left corner of the Pivot chart area.

To filter a pivot chart, click one of those buttons; the resulting menu will allow you to sort, search, and select.

Chapter 19: Summary Tables

- Summary Table Concepts
- Subtotals Tables
- Consolidated Pivot Tables

Summary Table Concepts

As you may be getting the idea, there is data out there. A lot of data. So much data that even a hitchhiker's guide to data wouldn't help much. However, no panicking is needed. Data is collected into many databases and input into many places. It can be analyzed and used in many ways, of which Excel is one. Excel can express it in tables with calculations, sorts, filters, and other techniques. Still, it's data, and often a mindbogglingly lot of it. Excel needs

to be able to summarize data, and even summarize summarized data. Whew!

Pivot tables demonstrated one key way to do so. Also, maybe a basic table of core data that doesn't need the Pivot table steps but can be summarized within itself. Or, multiple core tables can be consolidated to be summarized. Or, Pivot tables/charts themselves (which are summarized data) might need to be summarized if one needs to review several of them for consistencies or trends.

Subtotals Tables

One way to summarize data is by using subtotals tables. Analyzing a large data range usually includes making calculations on the data itself, like totaling subtotals + tax amounts. You can summarize the data by applying summary functions such as COUNT, SUM, and AVERAGE to the entire organized range of information. Subtotals, in general, are summary functions applied to parts of an organized data range.

For example, in a Subtotal table you can SUM Current sales for sales reps from each region they sell to. To subtotal the information, the data must first be sorted by the Region field. For subtotals, the field that you sort is referred to as the **control field**.

If you choose the Region location in a dataset as your control field, all of the region entries will be grouped together within the data range, like the East region, West region, North region, etc. A SUM function then can be applied to add up the current subtotals field for each region's location. Excel calculates and displays the subtotal each time the region location changes.

In a Subtotal table, a new row containing a subtotal of that particular location will be inserted, and wherever the field changes a value will display; a subtotal group of records. Excel updates this subtotal information automatically when the control field is changed. In theory, when subtotaling, you are adding a calculation row to the set of data.

However, manually adding rows that total

information in the middle of an Excel Table Object would compromise the integrity of data in the basic table – the table object tools would look at the total as a *record*, not a calculation. Therefore the Subtotal feature cannot be used in Excel Table Objects, but can only be applied to a normal range of data. This means that you must convert all Excel basic tables to a regular data range prior to using the subtotaling option.

Multiple functions can be applied within the same Subtotal. Also, Subtotal data can be filtered.

The best practice when subtotaling is to follow four rules:

1. Sort the data first.
- Organize the information into groups so only one subtotal calculates per group.

2. Convert to a range.
- If the data set is in a table format you must remove the table properties by choosing, from the Table Tools - Convert to Range, to change the table area back a normal range. The Subtotal tool will be grayed out, and unavailable if the range is formatted as a table.

3. Select the control field.
- In the first line of the Subtotal command dialogue box, select the control field used to sort the data for the "**At each change in**" option. This ensures the subtotal will add a calculation row where each store location changes.

4. Subtotal within a Subtotal.
- You can Subtotal within a Subtotal. You can also use multiple functions within the same subtotal. Ensure to uncheck "**Replace current subtotals**" in the Subtotal dialogue box to keep the existing subtotal.

MedAttrib: Beginning to Intermediate Excel. MS Excel Subtotal Rules.

ACTION: Try Me activity

Let's now work with an Excel file: **Ch19–Summary.xlsx**. This is a dataset from Taste du Monde of products and their prices. Before starting work, save a copy of **Ch19–Summary.xlsx** to your Examples folder. Then, open that file for work.

Because there are two tasks on different sheets, the images of our progress will appear through the chapter.

There are 5 worksheets in **Ch19–Summary.xlsx**. The dataset in the Sales worksheet is a table object for easy sorting. Let's find out how to create a subtotals table from it. Follow the below steps to Subtotal the sales reps and provide a total current sales per region.

- Double-click the **Sales** worksheet name tab, and choose to *make a copy* of the sheet to follow the Sales worksheet. This is

so we don't adjust the Sales worksheet's main table's data as we learn.

- Rename the copy of the Sales worksheet as **SalesSubtotals**.
- Select the **SalesSubtotals** worksheet and click anywhere in the table area.
- From the Data tab, choose Sort button. Sort the **Region by A to Z**.
- Select "**Convert to Range**." Excel will display a message asking if you really want to convert the table back to a normal range. Choose **Yes**.

TIP: Converted tables. Converted-to-text table heading rows no longer have filter buttons. The data looks like a table but is not an Excel table object any longer. The table tools are not active, and the information is a normal dataset. Also, any table name you assigned in the Table Design menu's Table Name field will not translate.

- Next, click the Data ribbon tab, in the Outline group, and find & select the **Subtotal icon**.

- In the Subtotal dialogue box, choose the Region field in the "**At each change in**." For the "**Use Function**," choose **Sum** (which is the default setting**)**, and check **Sales** from the Add Subtotal to list. Click **OK.**
- **SAVE your work**.
- Scroll down the worksheet, and observe that the Sales column is totaled, per region, Like East, Island, etc.

Subtotal Outline View

For the summary table to be at all useful – especially if the table is more than a page or two long, there has to be a way to manage what we are seeing. The summary table **Outline** views, located on the left side panel, show summary statistics. The Outline tool, with levels, allows you to control the expanse of detail displayed in the worksheet.

Currently, the dataset defaults to showing everything. On the left side of the dataset, look for the minus signs in the lines of the 'levels.'

These behave as collapsing icons. If you click one, the level it represents will collapse out of sight.

The SalesSubtotals worksheet has three levels in the Outline of its data range:

- **Level 1** displays only the grand totals. It is currently uncollapsed.
- **Level 2** displays the total spent at each region. It is currently uncollapsed.
- **Level 3** displays the total sales. It is currently uncollapsed.

The image below shows the Level 3 Outline, all the sales reps detail per region, which by default is uncollapsed. Clicking the outline buttons located to the left of the row numbers lets you choose how much detail you want to see in the worksheet. (Note that the three level numbers are at the top left side of the worksheet, just below the Name box.)

MedAttrib: author-generated. MS Excel subtotals table.

You will use the outline buttons to expand and collapse different sections of the data range.

- **Click level 1**. Notice it displays the Grand Total.
- **Click level 2**. Notice the totals for all store locations are displayed.

Consolidated Pivot Tables

Next let's learn how to consolidate multiple tables of data so they can be viewed (and

charts created) from one summary table. We will be doing this with Pivot tables, not the main or the Biannual tables. Why? Because Pivot tables already do that consolidating of Excel basic tables or datasets. This is an additional method which allows you to *consolidate multiple pivot tables.*

NOTE: The Excel built-in table wizard demonstrated below does not work for MACs. *As a result, MAC users would need to combine "separate" original data tables into one longer data table on a new sheet, and create a single pivot table from that single table instead. Extra steps but possible.*

FOR PC USERS

- In the **Ch19–Summary.xlsx** file, click on the worksheet Biannual1 and review it. This sheet contains all the same data as the main Sales worksheet's basic table, but only for the first half of 2022. The Biannual2 sheet contains data from the second half of the year.

In this activity's case, for real life there isn't

really enough data to require this kind of table separation, but consider if a lot more data is actually collected quarterly or monthly, then compiled into a full annual table, yet still needs some summarizing by quarter or biannual range. This is what *Consolidated Pivot tables* can help with. This chapter's file already has the main table separated into two Biannual worksheets with an appropriate Excel basic table on each, then a Pivots worksheet in which Pivot tables have already been created from those two Biannual Excel basic tables.

In **Ch19–Summary.xlsx**, go into the Pivots worksheet. The Pivot tables are currently sorted by the segment of the customers who make purchases (Business and Home), the categories of the products they chose (like Cookery), and the regions the different regions had purchases made from. Let's consolidate this data into *a single Consolidated Pivot table* for expressing to a pie Pivot chart.

- Go to the **Consolidated worksheet**. There are prep areas for two different summaries. We will focus on the first – creating a Consolidated Pivot table. *Remember,*

these will be MS Windows for PC steps only.

· Click somewhere around cell **A5**.

· Press your keyboard's **Alt key and D key** at the same time, then release. Then press the **P key**. A *PivotTable and PivotChart Wizard* will open the <u>first</u> of 3 steps.
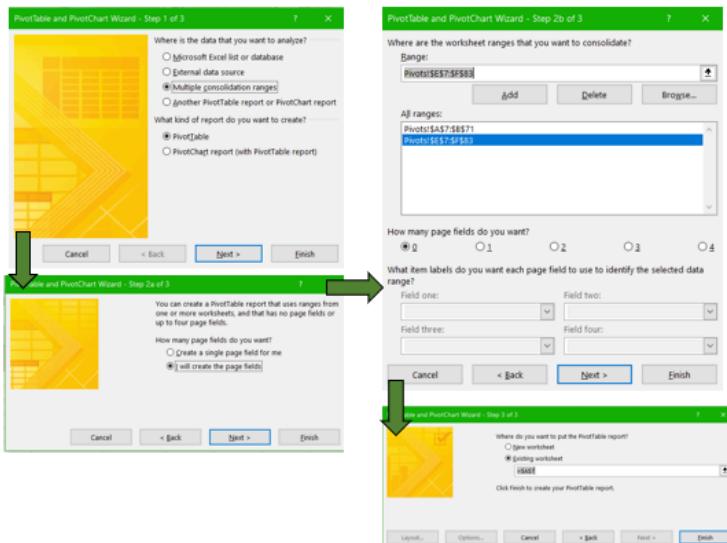
MedAttrib: author-generated. MS Excel consolidating tables Wizard.

· The data we need for a Consolidated Pivot table will come from more than one existing Excel <u>Pivot</u> table, so select the

Multiple consolidation ranges.

- Also, choose **Table** only, then click **Next**.
- For *step 2a*, choose "**I will create the page fields**", because <u>you</u> will be selecting where the data comes from.
- Click **Next**.

Step 2b requires us to tell Excel where the data we want to consolidate is *coming from*. It will be from each of the two Pivot tables in the Pivots worksheet.

- First, while this step is open, enter the Pivots worksheet, then select all of the cells of data in the whole first Pivot table, **NOT including** any grand total. *NO GRAND TOTAL*, which if included would completely skew your Consolidated Pivot table's amounts. Once you select the header row and data rows (minus the grand total row), the data range address will pop into the Wizard's step 2b **Range field**.
- Then press the **Add button** above the range. This will add the range into the window showing the existing range selections.

- Next, while still in this step, select all of the cells in the second Pivot table (minus the grand total row) in the Pivots worksheet. Once you select it, the data range will pop into the Wizard's 3rd step **Range field**.
- Then again press the **Add button** above the range. Now you should see two data ranges in the window.
- Keep the "How many page fields do you want" at the default **0**.

You should now see two listed ranges of data.

- Click Next to get step 3, which asks where you want the resulting Consolidated Pivot table. In the Existing worksheet field, type **=$A$7**. This will place your Consolidated Pivot table in the Consolidated worksheet's cell **A7**.
- Click **Finish**.
- **SAVE your work**.

PIVOT TABLE CLEANUP – Both PC and Mac

A new **pivot** table has now opened in your

Consolidated sheet starting at cell **A7**. It doesn't look very helpful. Let's tidy it up, first by narrowing it to something we'd like to understand. Let's say that we'd like to see the sales of only the Business and Home segments, but in percentage (not dollar) format.

- In the **Consolidated Pivot** table, use the Row Labels filter to unselect everything, then choose only **Business** and **Home**.
- In the PivotTable Fields panel, uncheck the **Column**. This will remove a column from the Consolidated Pivot table.
- In the PivotTable Fields panel, click the arrow in the Sum of Value field. Choose **Value Field Settings**.
- In the Value Field Settings dialog box, choose the **Show Values As** tab.
- In that tab, click the dropdown menu, and select **% of grand total**, then click **OK**.
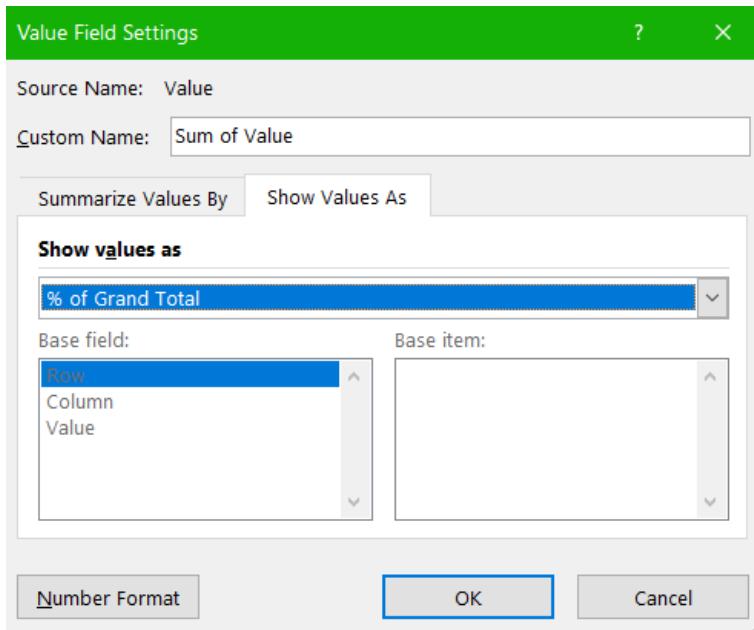
MedAttrib: author-generated. MS Excel Value
Field Settings panel.

- In the resulting changed **pivot** table, select
  cells **B8-B10**, and format them with **no
  decimal point**.
- In cell **A7**, overwrite the text with the word
  Segment.

Now we have a basic Consolidated Pivot table,
made from two Pivot tables that came from
two biannual Excel basic tables derived from a
bigger Excel base table. Oh. . . my . . .

FOR MAC USERS:

because Mac users do not have access to the Wizard used above, they have to consolidate info differently. It is a little more cumbersome, but can yield the same results. However, this isn't really a great option for massive tables, though PowerQuery and Power Pivot (more advanced) can do a lot more. For now (**MACS ONLY**):

1. You will need to create a new sheet <u>after</u> the two Biannual sheets. Name it **AllSales**.
2. Copy the full table from Biannual 1 and paste it in cell A4.
3. In Cell A4, change January-June 2022 Sales to read **All 2022 Sales**.
4. Copy the full table from Biannual2 and paste it into the <u>AllSales sheet</u> in the **first A cell** just *below the end* of the Biannual1 table you already pasted in there.
5. Go to the Biannual1 sheet, and copy **Rows 1-3**, then paste them into the *AllSales sheet's Rows 1-3* to make the Taste du Monde/website link consistent on the

AllSales sheet.

- ◦ At this point, the new AllSales sheet should have the combined data from the Biannual1 and Biannual2 tables copied into it plus the same Rows 1-3 Taste du Monde title/icon/website link.

6. NEXT, in the Consolidated worksheet, click in **Cell A7**, and create a pivot table based on the AllSales sheet's <u>All 2022 Sales table</u>.
7. Finally, scroll up this textbook page to this chapter's **PIVOT TABLE CLEANUP – Both PC and Mac** instructions, and follow those to set up your new pivot table.

CHART

How about a slice of pie? Or, more accurately, a *Pie Chart*?

- Click in the Consolidated Pivot table, and in the PivotTable Analyze ribbon, click the **PivotChart Icon**. This is to create a chart from a Pivot tab

- Choose a **Pie, 3D option** and click **OK**.
- Drag the new Pie chart so that it is to the right of the Consolidated Pivot table.
- Right-click on the Pie chart, and in Add Data Labels, choose **Add Data Callouts**.
- **SAVE your work**, and close the file. We're done!
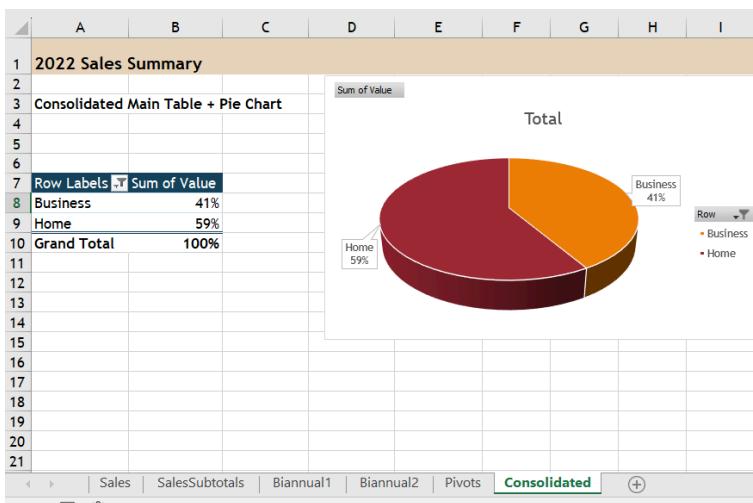
MedAttrib: author-generated. MS Excel consolidated table and chart.

Part 6: Data With Charts/Graphs

One of the most important things to consider when using charts in Excel is that they are intended to be used for communicating an idea to an audience. Your audience can be reading your charts in a written document or listening to you in a live presentation.

In fact, Excel charts are often imported or pasted into Word documents or PowerPoint slides, which serve this very purpose of communicating ideas to an audience. The thing to keep in mind is that if a chart is confusing – if the data isn;t simplified and makes easy visual sense, the chart won't communicate well at all, but be a space waster. Know what you need your audience to visualize, and what your data is capable of expressing properly, in choosing chart/graph formats.

Although there are no rules set in stone for

using specific charts for certain data types, some chart types are designed to communicate certain messages better than others. Excel has a recommended Chart/Graph part of the process to help you visualize how the data you have to work with can appear. This section explores numerous charts that can be used for a variety of purposes.

Chapter 20: Chart/Graphs

- Charts/Graphs Concepts
- Bar Charts
- Line Charts
- Pie Charts
- Column Charts
- Doughnut Charts
- Sparklines

This section reviews a few of the most commonly used Excel chart types. There are actually more, but they can be very specialized and require datasets beyond the basics/ intermediate level, for particular workflows and industries. To demonstrate the variety of chart types available in Excel here, it is necessary to use a variety of data sets. This is necessary not only to demonstrate the construction of charts but also to explain how to choose the right type

of chart given your data and the idea you intend to communicate.

Charts/Graphs Concepts

Before we begin, let's review a few key points you need to consider before creating any chart in Excel. A chart or graph should exist to clearly demonstrate the analysis of some data in a way that makes sense to the audience, A chart isn't meant to be a static graphic; it needs to communicate something that the viewers need while making a decision and considering actions to take. Is it showing a comparison, or a trend, or a problem in numbers, etc.?

The concepts of chart and graph tend to be used interchangeably, but they have slight differences.

Chart: Tables, diagrams or pictures that organize large amounts of data clearly and concisely, like in bars, pies, columns, etc.

Graph: Graphs tend to focus on raw data and

show trends over time, such as with scatters, line charts, trendlines, etc.

First, you need to determine which kind of chart to use.

- **The first key point is to identify your idea or message**. It is important to keep in mind that the primary purpose of a chart is to present quantitative information to an audience in a visual way. Therefore, you must first decide what message or idea you wish to present. This is critical in helping you select specific data from a worksheet that will be used in a chart.
- **The second key point is to select the right chart type**. The chart type you select will depend on the data you have and the message you intend to communicate. Some tables or pivot tables may *not* be better explained/visualized with a chart or graph.
- **The third key point is to identify the values that should appear on the X and Y axes**. One of the ways to identify which values belong on the X and Y axes is to sketch the chart on paper first. If you can

visualize what your chart is supposed to look like, you will have an easier time selecting information correctly and using Excel to construct an effective chart that accurately communicates your message.

Chart/Graph Tips

- **X-Axis on a chart:** When using line charts in Excel, keep in mind that anything placed on the X-axis is considered a descriptive label, not a numeric value. This is an example of a category axis. This is important because there will never be a change in the spacing of any items placed on the X-axis of a line chart. If you need to create a chart using numeric data on the category axis, you will have to modify the chart. We will do that later in the chapter.
- **Y-Axis Scale:** After creating an Excel chart, you may find it necessary to adjust the scale of the Y-axis. Excel automatically sets the maximum value for the Y-axis based on the data used to create the chart. The minimum value is usually set to zero. That is usually a good thing. However,

depending on the data you are using to create the chart, setting the minimum value to zero can substantially minimize the graphical presentation of a trend.

· **Carefully Select Data When Creating a Chart:** Just because you have data in a worksheet does not mean it must all be placed onto a chart. When creating a chart, it is common for only specific data points to be used. You might need to create a named data range, or a pivot table, in order to narrow down the data to be charted.

Constructing an Excel Chart

Step	Description
Define the message	Identify the main idea you are trying to communicate to an audience. If there is no main point or important message that can be revealed by a chart, you might want to question the necessity of creating one.
Identify needed data	Once you have a clear message, identify the data on a worksheet that you will need to construct a chart. In some cases, you may need to create formulas or consolidate items into broader categories.
Select chart type	The type of chart you select will depend on the message you are communicating and the data you are using.
Identify the values for the X and Y axes.	After you have selected a chart type, you may find that drawing a sketch is helpful in identifying which values should be on the X and Y axes. In Excel, the axes are:
	The "category" axis. Usually the horizontal axis – where the labels are found.
	The "value" axis. Usually the vertical axis – where the numbers are found.

MedAttrib: author-generated. MS Excel Chart planning.

Types of graphs/charts

- **Area:** Like a line chart but with the area below the line filled in. Highlights magnitude of change over time.
- **Bar:** highlights individual figures at a specific time or indicates variations between components – but not in relationship to the whole.
- **Box & Whisker:** Displays medians, quartiles, and extremes of a data set on a number line to show the distribution of data. Lines appearing vertically are called *whiskers* and show variability outside the upper and lower quartiles.
- **Column:** Values are shown in vertical bars in a way that can compare items or show how values vary over time.
- **Combo:** Combines two or more chart types to make data easier to comprehend.
- **Funnel:** Displays values over multiple stages of a process; because the values

generally decrease, the shape of the chart resembles a funnel.

- **Histogram:** Condenses a data series into a visual representation by grouping data points into ranges named *bins*.
- **Line:** Displays trends and overall change across time at even intervals, with an emphasis on the rate of change, rather than the magnitude.
- **Map:** Compares values and shows categories across geographical regions.
- **Pie/Donut:** Shows proportions of data and the relationship of the parts to the whole (like percentages of 100%).
- **Radar:** Accentuates differences and amounts of change over time as well as variations and trends. Each category has a value axis radiating from the center point with lines that connect all values in the same series.
- **Stock:** Shows the four values for a stock: open, high, low, and close.
- **Sunburst:** Shows hierarchical data with each level represented by one ring. The innermost ring leads the hierarchy.
- **Surface:** Exhibits trends in values across

two dimensions, in a continuous curve.

- **Treemap:** Offers a hierarchical view of data with proportions comparison within the hierarchy.
- **Waterfall:** Presents how an initial value is affected by a series of positive and negative values.
- **X Y (Scatter):** Demonstrates the relationships among numeric values in several data series, or plots interception points between *x* and *y* values.

Example Chart Decisions

The data this example comes from has generally too many data points to put on a column chart, which looks hard to interpret. A line chart can show changes in a more clear way.

Wrong Chart Type — Volume

Column charts are limited to a certain number of bars or data points. As you increase the number of bars on a column chart, it becomes increasingly difficult to read.

Appropriate Chart Type — Volume

A **line chart** is more commonly used when presenting a trend of data over a period of time.
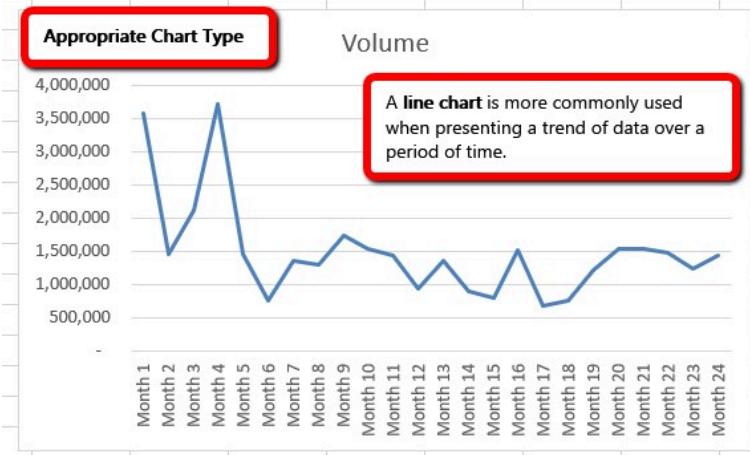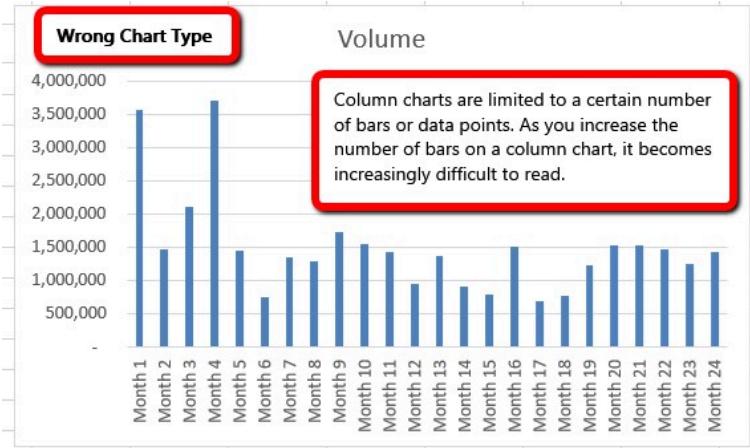
MedAttrib: Beginning to Intermediate Excel. MS Excel Chart Types.

Line Chart vs. Column Chart

We can use both a line chart and a column chart to illustrate a trend over time. However, a line chart is far more effective when there are many periods of time being measured. For example, if we are measuring fifty two weeks, a column chart would require fifty-two bars. A general rule of thumb is to use a column chart when twenty bars or fewer are required and there is enough room for the whole chart to be very readable. A column chart actually becomes difficult to read as the number of bars exceeds twelve or so, and twenty should be an upper limit.

Column Chart vs. Bar Chart

When using charts to show frequency distributions, the difference between a column chart and a bar chart is really a matter of preference. Both are very effective in showing frequency distributions. However, if you are showing a trend over a period of time, a

column chart is preferred over a bar chart. This is because a period of time is typically shown horizontally, with the oldest date on the far left and the newest date on the far right. Therefore, the descriptive categories for the chart would have to fall on the horizontal – or category axis, which is the configuration of a column chart. On a bar chart, the descriptive categories are displayed on the vertical axis.

Trendlines

Using a trendline on certain Excel charts allows you to illustrate the behavior of a set of data to determine if there is a pattern. Trends most often are thought about in terms of how a value changes over time, but trends also can describe the relationship between two variables, such as height and weight. In Excel, you can add a trendline to most types of charts, such as unstacked 2-D area, bar, column, line, inventory, scatter (X, Y), and bubble charts, among others. Chart types that do not examine the relationship between two variables, such as pie and doughnut charts that examine the

contribution of different parts to a whole, cannot include trendlines.

Note that many chart types are specific to particular types of data, not for general use. Data management focuses on skills-building for work in that data management and analysis area, like statistics, finance, mathematics, scientific, etc. In this chapter, we will focus on a few common charts you might come across in school assignments or routine workplace needs.

ACTION: Try Me activity

Let's now work with an Excel file: **Ch20–Charts.xlsx**. This is a dataset from Prisvard Tech, with various aspects of data we can use. Before starting work, save a copy of **Ch20–Charts.xlsx** to your Examples folder. Then, open that file for work.

We'll be completing several charts, and the images will appear through the chapter.

There are 6 worksheets. We will work through

each sheet for one chart type at a time, and place the finished chart for each on the same worksheet the data for it is on.

Bar Charts

A bar or column chart is commonly used to show trends over time, as long as the data are limited to approximately twenty points or less.

The **Ch20–Charts.xlsx** first sheet is for quarterly sales by region. This kind of data can be expressed in a bar chart, to highlight individual figures at a specific time.

Go to the **RegQSales** worksheet. This sheet expresses regional sales by quarter in an Excel table object with a total row. We'll start by determining if Excel recommends a frequency distribution chart, instead of going and looking for one ourselves.

- Click the table and go to the Insert ribbon, Charts group, and select **Recommended Charts**. Recommended charts offers both column and bar chart options.

- Choose the **Clustered Bar chart**, then click **OK**.
- A chart appears, floating over our data. Drag it so that its upper left corner is around cell **F1**, so that we can see it and some of the data.

Click on the Bar chart. Notice that when you do, the table is subtly highlighted to indicate that the left column (regions) is in use in the chart, and that the numeric data is also being referenced in the chart

- Drag the Bar chart's lower right-hand border to increase the chart size for better review.

Interestingly, the Bar chart does not have a title. Excel recognizes the data is a frequency distribution, but can't determine what emphasis the chart should be named after. You will need to decide.

- Click in the Bar chart's Chart Title text box, and type **Quarterly Sales by Region**.
- Click anywhere in the chart to select it, and observe how a contextual **Chart Design**

ribbon and related **Format** ribbon appear to the right of the other Excel ribbons.

- In the Chart Design ribbon, **Chart Styles group**, hover your cursor over the various styles for this Bar chart, and choose one that seems easy to view and interpret.
- In the Chart Design ribbon, Chart Styles group, choose **Change colors**, and see if there is a multi-colored palette that works for you. *Hint*: it is <u>not</u> recommended to use monochromatic (single color) color blends for a clustered chart, because they can blend together and be difficult to distinguish.
- **SAVE your work**.

We don't need to do any more with this chart, but let's interpret it. We are seeing a display of sales in each region, compared to each other for each quarter of the year. Some regions have lower sales. The 4th quarter sales seems to be consistently the highest, likely due to end-of-year/holiday spending.

	B	C	D	E
1		Prisvard Tech		
2		Regional Quarterly Sales 2022		
5	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
6	$ 72,500	$ 75,500	$ 68,500	$ 78,500
7	130,630	135,635	109,630	122,930
8	23,490	21,495	27,460	29,490
9	83,330	81,335	89,330	93,370
10	65,400	65,955	68,400	73,560
11	69,800	62,875	75,800	74,650
12	98,255	94,685	102,005	116,780
13	43,050	45,555	47,050	56,220
14	74,210	66,515	78,210	84,460
15	54,100	50,155	59,100	63,900
16	124,900	110,955	107,600	137,550
17				$ 931,410

Sheet tabs: **RegQSales** | Comparison | RepSales | MonthlySales | RegionalSales%

MedAttrib: author-generated. MS Excel bar chart.

Line Charts

The second **Ch20–Charts.xlsx** worksheet, named **Comparison**, compares monthly sales data for two segments that Prisvard Tech serves. This kind of data can be expressed in a line chart, to display trends and overall change across time at even intervals (in this case months).

- Go to the **Comparison** worksheet. Let's find out if Excel recommends a chart type.
- Click the table and go to the Insert ribbon,

Charts group, and select **Recommended Charts**. Interestingly, Recommended charts offers mostly bar and column options. We don't want that, so in the Insert Chart panel, select the <u>All</u> **Charts** tab and look for a **Line** chart.

- In the Line chart selection, choose the **Line with Markers** option, and the preview chart on the **right-side** of the preview. Then click **OK**.
- Excel will place the Line chart on the Comparison worksheet, and you may need to drag it below the table, so it doesn't cover the data.

Again, the created chart does not have a title.

- Click in the Line chart's Chart Title text box, and type **Quarterly Sales by Region**.
- The Line chart uses colors that Prisvard tech doesn't favor; in the Chart Design ribbon, **Chart Styles group**, hover your cursor over the various styles for this Line Chart.
- Choose **Colorful palette 2**.
- **SAVE your work**.

We don't need to do any more with this Line chart, but let's interpret it. It seems as if there has been more movement and variation in the sales of products to customers of the home segment than there was for those in the business segment.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1							Prisvard Tech						
2							2022 Segment Comparison by Month						
3	Line Chart												
4													
5	Segment	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
6	Home	$ 189,000	$175,500	$222,880	$196,970	$190,740	$315,702	$209,090	$230,500	$245,880	$180,788	$336,743	$351,890
7	Business	42,428	44,490	43,670	41,550	48,230	55,010	42,760	36,980	48,788	51,428	55,428	58,374

RegQSales Comparison RepSales MonthlySales RegionalSales%
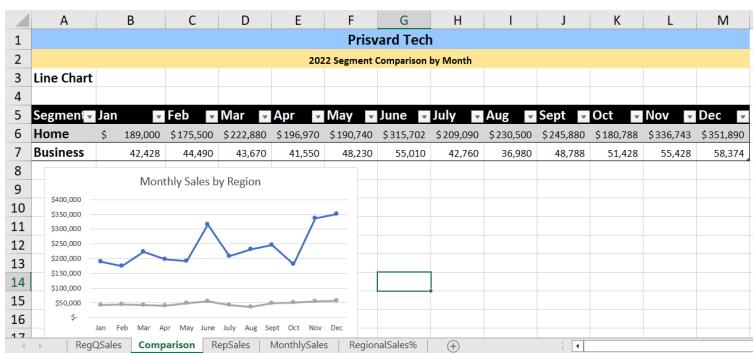
**MedAttrib:** author-generated. MS Excel line chart.

Pie Charts

The third **Ch20–Charts.xlsx** worksheet, named **RepSales**, shows the Sales Reps and their regions, and what percentage of all sales they were responsible for. This kind of data can be expressed in a doughnut or pie chart to reveal

proportions of data compared to the whole. Because there are more than three or four sales reps, a Pie chart might work well.

- Go to the **RepSales** worksheet, click the table and go to the Insert ribbon, Charts group, and select the **Insert Pie or Donut** (spelled out *Doughnut*) **Chart** icon.
- In the flyout selection, choose the **Pie**, then click **OK**.
- Drag the Pie chart to the right so that it doesn't cover the table data.
- In the Percentage text box (which is the chart title), type **Rep Sales by Percentage**.
- Click on the Pie chart, and go to the Chart Design format ribbon. In the ribbon, set the **width to 8 inches** and the **height to 5 inches**.
- Click on the Pie chart, and go to the Chart Design ribbon, and choose the **Chart Style 11**, which will add data labels for us.
- **SAVE your work**.

We don't need to do any more with this Pie chart, but let's interpret it. This chart only displays the percentages of overall sales by

sales rep. It doesn't offer insight as to why, so it might be a useful supporting chart but something else would have to give more context, such as a detailed caption with a description, or a different chart type.
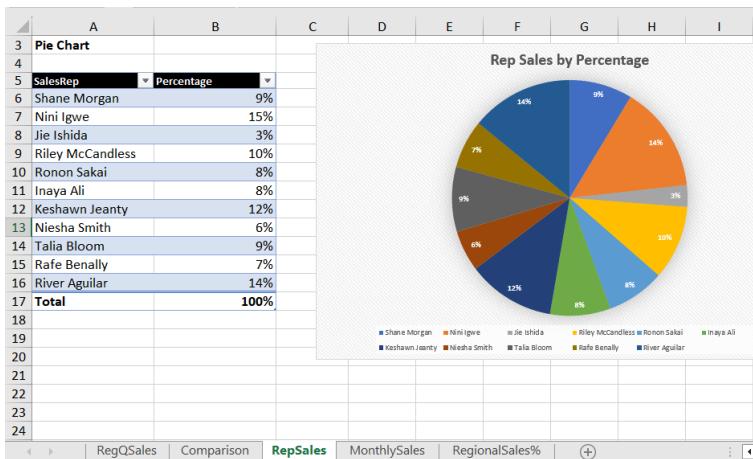
MedAttrib: author-generated. MS Excel pie chart.

Column Charts

The fourth **Ch20–Charts.xlsx** worksheet, named **MonthlySales**, shows the actual sales by month, compared to the projected sales. This kind of data can be expressed in a column

or bar chart to show trends over time (months). We've done a Bar chart, so let's do a Column chart here.

- Go to the **MonthlySales** worksheet, click the table and go to the Insert ribbon, Charts group, and select the **Recommended Charts** icon.
- In the selection, choose the **Stacked Column** chart, then click **OK**.
- Drag the Column chart to the right so that it doesn't cover the table data.
- Click in the Column chart's Chart Title text box, and type **2022 Projected and Actual Sales**.
- Let's change the colors on this chart, and make it **3-dimensional** so it pops out a bit more.
- Click on the Column chart, and go to the Chart Design ribbon. In the ribbon, select **Change Chart Type**.
- In the Chart Type preview area for Column charts, choose the **3-D Stacked Column**, the preview on the **left**, and click **OK**.
- Click on the Column chart, and go to the Chart Design ribbon, then choose **Change**

Colors. Here, a monochromatic selection will work; choose the **bottom blue monochromatic palette**.

· **SAVE your work**.

We don't need to do any more with this Column chart, but let's interpret it. The stacked format shows a comparison between the projected and actual sales of each month. In this case, a clustered chart actually might make more sense, in order to see side-by-side differences between the projected and actual sales.
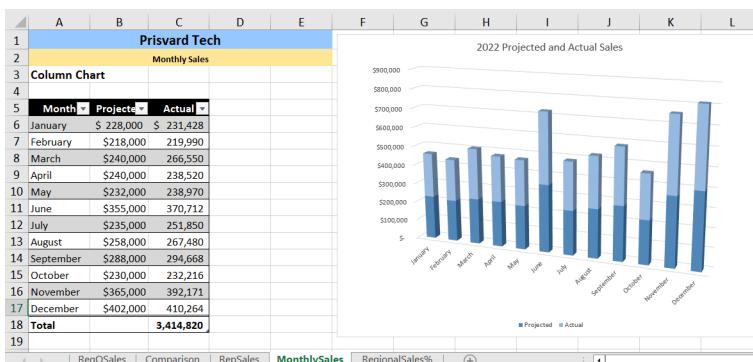
MedAttrib: author-generated. MS Excel stacked column chart.

Doughnut Charts

The fifth **Ch20–Charts.xlsx** worksheet, named **RegionalSales%**, displays a percentage of sales per Prisvard Tech's biomes (West, East, Mid country). This kind of data can be expressed in a pie or doughnut chart to show percentages of data compared to the whole. In this case, there are only 3 regions, which may be better represented in a doughnut chart; a pie chart would focus on the two date ranges, whereas a doughnut chart can focus on the three biomes.

- Go to the **RegionalSales%** worksheet, click the table and go to the Insert ribbon, Charts group, and select the **Insert Pie or Doughnut Chart** icon.
- In the flyout selection, choose the **Doughnut**, then click **OK**.
- Drag the Doughnut chart to the right so that it doesn't cover the table data.
- Click on the Doughnut chart, and go to the Chart Design ribbon, and choose the **Chart Style 3**, which will add data labels for us.
- Click on the Doughnut chart, and go to

the Chart Design ribbon, **Chart Layouts group**.

- Then, click on the Add Chart Element icon, choose **Chart Title**, and then choose **Centered Overlay**.
- Click on the Chart Title text box, and drag it just above the top of the doughnut.
- In the Chart Title text box, type **Biannual Biome Sales Percentages**.
- Click the Doughnut chart, go to the Chart Design ribbon, Data group, and click the **Switch Row/Column**. This will change the legend to the regions from the existing date ranges.
- Click the Doughnut chart, go to the Chart Design ribbon, and choose the **Change Colors icon**.
- Choose the **Yellow monochromatic** palette.
- **SAVE your work**.

We don't need to do any more with this chart, but let's interpret it. This chart displays the percentages of sales over two ranges within the year, and over three biomes. It doesn't offer insight as to why, but doesn't really need more

information to interpret it. The monochromatic colors, however, don't have the clearest edges to separate the date ranges.
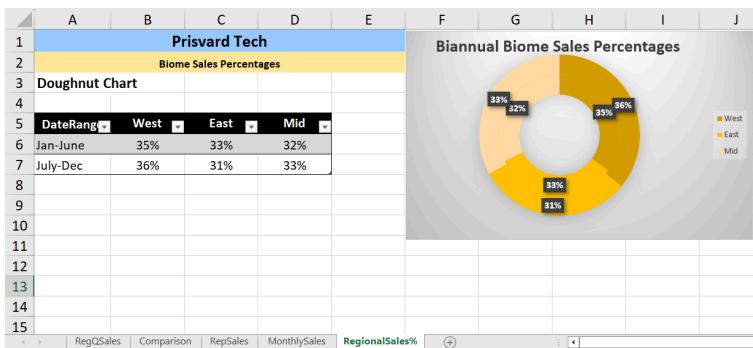
MedAttrib: author-generated. MS Excel doughnut chart.

Sparklines

Sparklines are miniature charts that can be embedded into the background of a cell. Entire sparkline charts exist within single cells. Since Sparklines can be placed directly next to the data set being represented, viewing them allows the quick determination of trends or patterns within the data without looking at a separate chart. Consider using Sparklines to

illustrate high and low values within a range, as well as trends and other patterns

The sixth **Ch20–Charts.xlsx** worksheet, named **Sparklines**, has a table that replicates the RegQSales table from the first worksheet, although this table is colorized in grays, not black. This kind of data can be expressed with Sparklines, because Sparklines consider data over a period of time (like 4 quarters) and present a line chart, or a bar chart, for it. In the case of Sparklines, these charts actually fill in the cells of the table next to the data, rather than being created as a separate chart object. Because of this, you can also type in the cells with the Sparklines; the text will float over the lines, or the column can be widened to the text and Sparklines can have enough room to be viewed clearly.

Sparklines first have to be added to <u>new, empty</u> cells.

In the Sparklines sheet of **Ch20–Charts.xlsx**, select the cells **F6-F16**, which are empty and just to the right of the 4th Qtr data. These cells are already "in the table" since this worksheet

already has a column header for Lines, and another column header to its right for Columns.

- After selecting cells **F6-F16**, use the Insert ribbon's Sparklines group to choose the **Line** icon. A Create Sparklines dialog box opens.

The Location range is already filled with the cells you have selected in the F column: **$F$6:$F$16**

- In the Data Range, select cells **B6:E16** (<u>not</u> the totals row). This allows the Sparklines to summarize the Region quarterly data. for rows 6-16.
- Click **OK**.

Column F will now show sparklines in each cell of rows 6-16. Let's make them more visually striking for easier viewing.

- Click on one of the Sparkline cells to activate it, and a contextual Sparklines ribbon will appear in the Excel ribbons area.

- Click the **Sparkline Color** icon on the ribbon.
- In the dropdown menu, select **Weight**, so we can make the Sparkline more prominent.
- In the Weight dropdown, choose **3pt**.
- In the Sparkline ribbon, Show group, put a checkmark in the **High point** and the **Low point** checkboxes.
- In the Sparkline ribbon Style group, select the **Red Sparkline Style Dark 3**.
- **SAVE your work**.
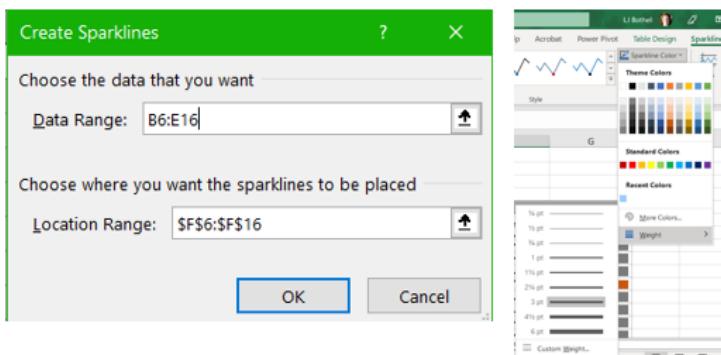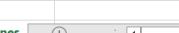
MedAttrib: author-generated. MS Excel Create Sparklines and Sparklines ribbon options.

Let's repeat most of these steps to add a Column Sparkline element to **column G**.

- Select cells **G6-G16**, and use the Insert ribbon's Sparklines group to choose the **Column** icon. A Create Sparklines dialog box opens.

The Location range is already filled with **$G$6:$G$16**.

- In the Data Range, select cells **B6:E16**.
- Click **OK**.
- In the Sparkline ribbon, Show group, put a checkmark in the **High point** checkbox. The high point will now show as a gray, rather than brownish colored column.
- In the Styles group, choose the **Brown Sparkline Style Accent 2 Darker 25%**.
- **SAVE your work** and close the file. We're done!

	A	B	C	D	E	F	G
1				**Prisvard Tech**			
2				Regional Quarterly Sales 2022 Sparklines			
3	**Sparklines**						
4							
5	**Region**	**1st Qtr.**	**2nd Qtr.**	**3rd Qtr.**	**4th Qtr.**	**Lines**	**Columns**
6	Mountain	$ 72,500	$ 75,500	$ 68,500	$ 78,500		
7	EastCoast	130,630	135,635	109,630	122,930		
8	Island	23,490	21,495	27,460	29,490		
9	MidWest	83,330	81,335	89,330	93,370		
10	NorthCentra	65,400	65,955	68,400	73,560		
11	NorthEast	69,800	62,875	75,800	74,650		
12	NorthWest	98,255	94,685	102,005	116,780		
13	South	43,050	45,555	47,050	56,220		
14	SouthEast	74,210	66,515	78,210	84,460		
15	SouthWest	54,100	50,155	59,100	63,900		
16	West - CA	124,900	110,955	107,600	137,550		
17	Total				$ 931,410		
18							
19							

RegQSales | Comparison | RepSales | MonthlySales | RegionalSales% | **Sparklines** | ⊕

MedAttrib: author-generated. MS Excel Sparklines example.

Chapter 21: Chart/Graph Modifications

You can use a variety of formatting techniques to enhance the appearance of a chart/graph once you have created it. Formatting commands are applied to a chart for the same reason they are applied to a worksheet: they make the chart easier to read. However, formatting techniques also help you qualify and explain the data in a chart. For example, you can add footnotes explaining the data

source as well as notes that clarify the type of numbers being presented (i.e., if the numbers in a chart are truncated, you can state whether they are in thousands, millions, etc.). These notes are also helpful in answering questions if you are using charts in a live presentation. You can change the arrangement of some row or column references by making them bigger or moving them on the chart. You can clarify axes information beyond the defaults that Excel provides in chart creation.

We'll look at a few options in this chapter. They can and should become part of your chart creation process.

ACTION: Try Me activity

Let's now work with an Excel file: **Ch21–ChartsDetail.xlsx**. This contains two of the charts we worked on in Chapter 20. Before starting work, save a copy of **Ch21–ChartsDetail.xlsx** to your Examples folder. Then, open that file for work.

We'll be working with two charts, so the

finished images will appear later in this chapter. You can scroll down to see them now, if you wish.

There are 2 worksheets: **RepSales** for a Pie chart, and **MonthlySales** for a Column chart.

Accessibility

Charts are graphic items, like photos, shapes, tables, and SmartArt. Whenever you place one in Excel, you should make a point of making sure it meets accessibility standards for when the workbook is distributed. You also might want to add some intellectual property information, so that the Excel metadata for the workbook accounts for the chart creation. More information on how to do this is in the *Distribution chapter* of this book.

In **Ch21–ChartsDetail.xlsx**, go to the first worksheet: **RepSalesChart**.

The chart actually does not have a name. In Excel, all items you create should be given a name, whether a table, a data range you need

to calculate with, images, SmartArt, shapes, and charts. This is, for instance, so that data range info is easier to find; so that formulas/functions can use named ranges instead of manual cells selections; and so other users of your Excel workbooks can easily identify important ranges of data.

However, naming a chart is not as self-evident as it is for naming a table. There is no Chart Name field in the contextual Chart Design ribbon tab like there is for naming Excel tables.

- Click on the Pie chart, and go to the Excel **Name box** at the left end of the Formula Bar. In it, the Pie chart will be named something like Chart1 or Chart37. In the Name box, overwrite the existing name with something that identifies the chart, like **PTsaleschart**. This helps identify the Pie chart if it is needed in any other Excel reference.
- To help the Pie chart be recognized by a screen reader, click on the chart and go to the Chart Format ribbon's **Accessibility group**.
- Click the **Alt Text icon**. This opens a panel

that lets you add alternate text to a chart/ graph, so that a screen reader can interpret for a user who cannot see the chart.

- In our case, for practice, simply type: **Excel pie chart of 2022 sales by percentage.**

All this does is let a screen reader know there is an image and offers a summary of what the image is. However, note that the details of the chart itself, like what the percentages are, who the sales representatives are, and other table-related information isn't something that can go into alternate text. Any remaining accessibility has to be part of overall Excel workbook creation.

You can also add appropriate attribution information on a chart by giving it a caption with this content as well as a brief description of what the chart is. If you create the chart itself, but from other data, you should also give attribution/citation of the data.

- Click on a cell below the Pie chart – cell **D20** – and write a simple caption: **Prisvard Tech's sales representatives' 2022 sales**

by percentage.
- **SAVE your work**.

Filtering Charts/Graphs

Charts and their graphs can be filtered, as needed. This doesn't pivot the information with the same flexibility as Pivot tables and Pivot charts, but Excel does allow tables and charts to accept and refresh to show changes in the table filters.

- In the **RepSalesChart** worksheet, click on the table to activate it.
- In cell **A5**, use the filter button to deselect all, then select only **Inaya**, **Nini**, and **River**.
- **SAVE your work**.

The Excel table will show only the percentages of those three sales reps, and the Pi chart will refresh to do the same.

- In cell **A5**, use the filter button to **clear the filter**.

Chart Labels

Review the Pie chart. Notice how small the labels are. They are white on the color backgrounds, but they are so small they may fade into the overall chart and not provide much information.

Click on the Pie chart, and look at the top right side of its border. There are 3 icons that, when clicked, open a variation of the various options you can access from icons on the Chart Design and Format ribbons.
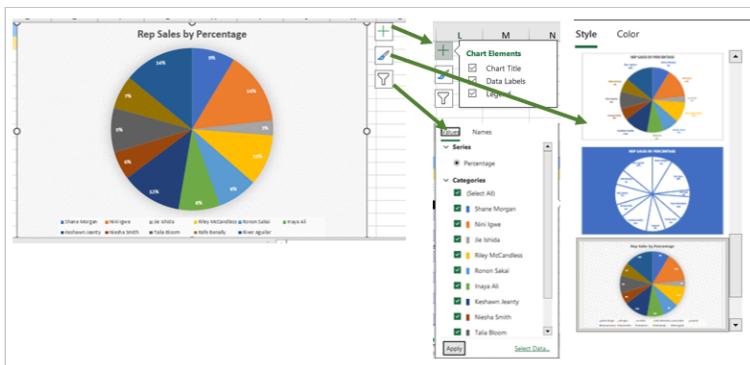
MedAttrib: author-generated. MS Excel Chart options.

- Click on the chart, and go to the Chart

Format ribbon, **Chart Layouts group**.

- Click the Add Chart Element, then choose Data Labels, and **More Options**.

Excel will open a **Format Data Labels** panel to the right of the workspace. In it, you can work with the Label Options (types of labels) and Text options (granular detail of how the labels are formatted). Note that dealing with labels, legends, and other individual chart elements is not for the faint of heart or something that can be done fast and easily. It takes patience, and may require touching each element separately. Still, let's see what we can do.

NOTE: As you later click on different areas of your chart (title, legend, an axis) the **Format panel** will change the panel's format area name depending on what chart area you clicked, like to *Format Axis, Format Data Series, Format Title*, etc.

- For instance, in the Format Data Labels panel, select Label Options, and in the dropdown, select **Series "Percentage" Data Labels**.

This selects **all** of the tiny percentage numbers in the pie chart at one time.

- Then, with those selected, click in the **Panel's Text options**. There is nothing that lets you change all the labels' text size. Let's try some other method.
- With those text boxes still selected, go to the **Home tab Font group**, and change the font size to **18**. Yay! That lets you change the font size all at once, (unlike back in the author's salad days, decades ago. . .) which is pretty cool.
- Click the chart somewhere away from the data labels, and the panel at the right will rename itself **Format Chart Area**. This allows you to format various things using this same panel.
- Click the Chart Options, and select **Legend / More Options** This selects the visual representation of the chart's data series (in this case, the sales reps) shown at the bottom of the chart. These are tiny, too.
- With this Legend area text selected, go to the **Home tab Font group**, and change the font size to **12**. That let you change the font

size for the legend all at once. This increases the space needed and decreases the pie chart's graphic a little, but overall, the chart is more readable.

- **SAVE your work**.

TIP: Formatting Axes shortcut step. You can actually double-click on a horizontal category X axis, a vertical (value) Y axis, a chart's title box, and a chart's legend, to open the needed item's Format Chart panel options instead of using those 3 icons at the side of the chart.
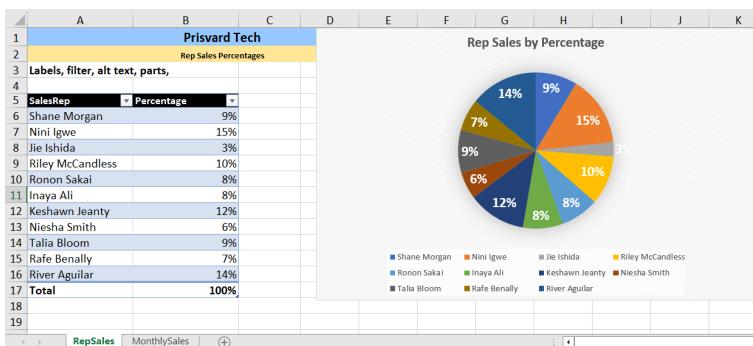
MedAttrib: author-generated. MS Excel pie chart modifications.

X-Axis and Y-Axis Formats

Let's work with the other chart, Go to the second worksheet: **MonthlySales**. It shows a stacked Column chart with an X and Y axis.

Review

Let's start by changing the chart type, since the provided Stacked Column chart in the **MonthlySales** worksheet doesn't really give the kind of comparison that is easy to discern. A Clustered Column chart might work better.

- Click the chart, go to the Chart Design ribbon, and choose the **Change Chart Type icon**. Choose a **Clustered Column**, the version in the **left-side preview**, and click **OK**.
- Next, use the Change Colors icon to change the colors to **Colorful Palette 2**.
- In the Chart Format ribbon, set the chart **width to 7.5 inches** and the **height to 5 inches**.

- In the Chart Format ribbon, click the **Alt Text icon**.
- In the Alt Text panel, type **Prisvard Tech projected and annual sales chart**, then *close* the Alt Text panel.
- Click the Column chart, and look at its name in the **Name Box** to the left of the formula bar.
- In the name box, overwrite the content with **PTactsaleschart** and press **Enter**.
- **SAVE your work**.

Chart Axes

There are numerous formatting commands we can apply to the X-axis and Y-axis of a chart like the column, bar, line, or other axis-based charts. Although adjusting the font size, style, and color are common, many more options are available through the Format Axis pane that can help make the information more readable and useful for interpretation and analysis. Try the below steps to make some changes to the percentage numbers on the **vertical (value) Y-axis**.

- In the **MonthlySales** worksheet, click on the *2022 Projected and Actual Sales chart*. Click once on the **vertical (value) Y-axis** – the values are the <u>numbers</u> of the projected and actual sales.
- Go to the **Home tab Font group**, and change the font size to **14**.
- Click once on the **horizontal category X-axis** to select the month labels – which is the <u>category</u> for this axis.
- Go to the **Home tab Font group**, and change the font size to **12**.
- Double-click on the same **horizontal category X-axis**, which will open a **Format Axis panel**.

The **Format Axis** panel offers Axis options for placement, showing faint tick marks, and several other micromanaging choices.

- In the Axis Options, choose Labels, and in **Distance from Axis**, change 100 to **20**.
- In the Text options, choose the Text Fill & Outline icon, and under **Solid Fill**, change the color to a **dark blue**.
- Close the Format Axis panel.

- **SAVE your work**.

Chart Area Titles

Titles for the X and Y axes are necessary for defining the numbers and categories presented on a chart. For example, by looking at the 2022 Projected and Actual Saleschart, it is not clear what the percentages along the Y-axis represent. The following steps explain how to add titles to the X and Y axes to define these numbers and categories:

- Click anywhere on the 2022 Projected and Actual Sales chart to activate it.
- In the upper right corner of the graph, choose the **Charts Element plus sign**. Select Axis Titles in the dropdown, then checkmark **Primary Horizontal** and **Primary Vertical**. This inserts the place holders that you can type text in.
  - **Mac Users:** click the "Add Chart Element" button in the Design tab, point to "Axis Titles" and click on "Primary Horizontal." Do this one more

time and click on "Primary Vertical".

One problem is that these Axis titles seem to run into things. The Y-axis and its title run together, and the X-axis title runs into the Legend. Ugh.

- Click on the chart, and choose the **Charts Element plus sign** again.
- Choose Legend, and then **Top**. This gets the Legend out of the way of the X-Axis title.
- Carefully click on the **vertical (value) Y-axis title**. Drag it to the top of the chart.
- Double-click the Y-axis title to open the **Format Axis Title panel**.
- In the panel, choose Title options, then the **Size & Properties icon**.
- Below that icon, click **Alignment**, and in the dropdown, choose **Text Direction**.
- In Text direction, choose **Horizontal**.
- Close the Format Axis Title panel.
- Click the Y-Axis title, and on the Home tab Font group change the font size to **14**.
- Then type **Sales** in this -axis label.
- Now, let's do the other axis title. Click the

horizontal category X-axis title, and on the Home tab Font group change the font size to **14**.

- Then, type **2022 Months** in this X-Axis title.
- Now, let's make the Legend more readable. Click the **Legend**, and on the Home tab Font group change the font size to **18**.
- Now, let's make the Title pop more. Click the **Title**, and on the Home tab Font group change the font size to **20**.
- **SAVE your work**.

Data Series Labels

Adding labels to the data series of a chart is a key formatting feature. A data series is an item that is being displayed graphically on a chart. For example, the blue bars on the 2022 Projected and Actual Sales chart represent one data series. We can add labels at the end of each bar to show the exact percentage the bar represents.

- Be sure that the entire chart is selected,

<u>not</u> just one of the data series. Then click the **Chart Design** ribbon.

- On the **Design** tab select the **Add Chart Element** button, then **Data Labels**, then **Outside End.** Click on one of the **Data Labels**. Note that now all of the data labels for that data series should be selected.

- Now, given how dense this particular chart is, these data labels do not help – they make it almost unreadable.

- On the **Design** tab select the **Add Chart Element** button, then **Data Labels**, then **None.** This removes them.

- **SAVE your work**, and close the file. We're finished!
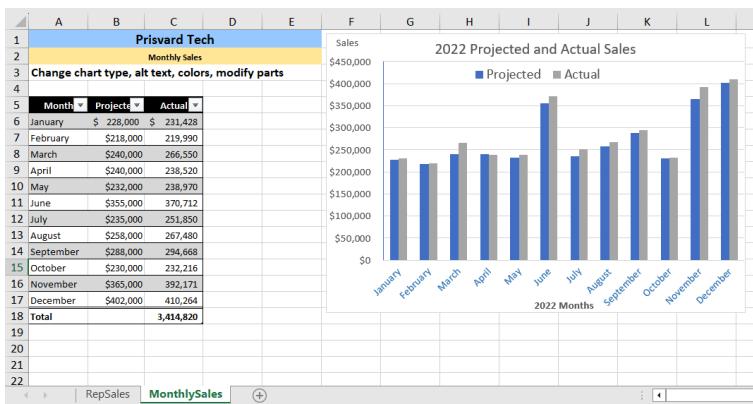
MedAttrib: author-generated. MS Excel column chart modifications.

Conclusion

Microsoft® Excel® is clearly a resource that can be used in many careers, and is valuable for professional and personal purposes. This textbook has focused on introducing the fundamental skills necessary to get you started in using Excel and to a solid intermediate level of proficiency, confidence, and comfort using the program.

While this content refers to Microsoft® Excel® current full-installation versions, the skills you learn and practice here are also consistent with open-source and other variations of spreadsheet programs, like those in Google, LibreOffice, OpenOffice, etc. You can also scale your work on Excel to use the lighter versions with some of what you learned and practiced here.

There is absolutely tons more to learn for you to move past intermediate-level workplace skills to more advanced industry-specific skills, business informatics management, complex

data analysis and modeling, interpreting and manipulating content from massive databases, etc. YouTube and other videos can give you insights, as well as other courses, books and articles. Be sure to check out **Creative Commons** for additional free courses, modules, practice exercises, and textbook content to help you out.

This *particular book* may later add another chapter or two to help expand some of this know-how on an introductory level. However, for now, this current content should easily prepare you for academic and workplace needs in entry-level to intermediate-level positions, in your own personal and entrepreneurial work, for geekery round-table-with-popcorn discussions (yes there ARE Excel-loving geeks out here!), etc.

ALSO, if you have constructive comments, suggestions of additional free links and info for learners, attributions I may have inadvertently missed (or messed-up) noting, and even how this content may have helped you out, please don't hesitate to let me know at **ljbtrainings@gmail.com**.

Signing off!

Author and Attribution

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L.J. Bothell has taught with both Seattle Central College in Seattle, and Shoreline Community College in Seattle/Shoreline. Subjects include: web design, business technology concepts, Adobe Creative Suite programs, Microsoft Office applications, and keyboarding skillsbuilding.

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This book has been developed with a good deal of additional content, new examples, and fresh assessments that are very different from

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