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Spreadsheet Basics
Spreadsheet software is a powerful productivity tool. It's a spreadsheet that allows you to organize and analyze numbers and text. It is the foundational skill set of many jobs that require basic to advanced analysis. Knowing how to use a spreadsheet can be helpful in securing a job, but also in performing in a variety of positions. There are a few different spreadsheet packages, like Microsoft Excel, but Google's productiity offering includes a free spreadsheet product.

To Use Google Spreadsheets, you will need a Google account. If you have a Gmail, Blogger or YouTube account, you already have one. Google Spreadsheets is part of the Google Drive cloud offering. Like Microsoft Office, Google Drive also has word processing and presentation products as well as form and fusion tables for advanced analysis.

Importing Data
1. If you have a comma separated value (csv) file or an existing spreadsheet (from Excel), you can import it by clicking on the arrow to the right of the Create button on the left.
2. Choose File and browse for your file.
3. Once uploaded, the file will appear in your Drive.

Inputting and Basic Math
1. Open Google Drive (drive.google.com). Login with your Google account if you have not done so already. The main drive area is where your files will be saved. This is also where you can share files and see the files others have shared with you.
2. Click the Create button on the left and choose spreadsheet.
3. You can name the spreadsheet at the top by clicking on Untitled Spreadsheet.
4. There is a menu across the top that provides the functions for File, Edit, View, etc.
5. Notice the layout of the spreadsheet, columns with letters, rows with numbers.
6. You identify a cell by the intersection of the column and row, i.e. A1, B25, C3, etc.
7. Start inputting 10 numbers going down in a column, starting in A1.
8. **Sum a column.** Excel has numerous functions (we will cover several). You invoke a function by typing in an "=" sign, then the function, then you put any parameters of the function in parentheses. For sum, you include the range of cells, separated by a colon.
   =sum(A1:A10)

9. If you begin the function and open the parentheses, you can select the range.
10. **Add two cells.** Now type in a second column of numbers in the B column and sum it. Let's add each row in C. Simply type "=" then select the first number, type a "+" and select the 2nd number. Hit enter.
11. **Copy cells**. To copy the function to all the rest of the column, find the dot in the bottom right corner of the cell. Click and drag to fill with all the sums. You can look

in each cell to see the formulas. You can also use basic copy/paste feature under Edit menu.

12. Use columns D, E, F to subtract, multiply and divide the A & B columns.
13. **Labeling Cells.** It's easy to work with numbers in a spreadsheet, but unless you label your cells, you have no idea what you are looking at. Let's insert a row in 1 to add columns for years, and a column at A to add labels for the categories (use anything you want). Select the cell where you want to insert the row or column, and choose Insert, Row (above or below) or Insert, Column (right or left). Add labels. You can use any of the formatting icons on the formatting toolbar (center, etc).
14. FYI, sometimes you need to select an entire row or column. You can do this by clicking on the number or letter. You can select everything in the spreadsheet by clicking the small cell that is in the top left corner.

Percentages

Percentages are often the best way to compare data in a relative manner.

1. Let's remove the items in the cells in C, D, E, F. Select the cells (click and drag over the letters to highlight) and choose Edit, Delete Columns.
2. To get the percentage of the total, we need to divide each cell by the sum. Do this in C1 for the first number in the A column. However, if you repeat the formula by dragging, you get an error. You have to set the divisor so it will be the same, an absolute rather than relative cell reference. You do this with the "$" sign and can hold either the row or the column. In this case, we want to hold the row. In the first formula, put a "$" in front of the number and letter that represents the sum. Now, you can drag and copy the do the rest of the percentages. The bottom one should be 100% (or 1, if not formatted yet). If you drag over to the next column, you get the same for the next column. You can see where this saves time in dealing with a large amount of data.

3. You can also use fn + F4 to toggle the absolute reference of the cell until the "$" is in the right position. Highlight the cell reference in the function bar first.

Formatting Cells

We have these nice cells with our percentages, but they aren't formatted as percentages. You format a cell under Format Number. Select the cells and apply an appropriate formatting.

Sorting

Now, let's put our categories in alphabetical order. You have to think about what you want to order and what needs to stay in place.

1. Select everything except the sum row.
2. Choose Data, Sort Range. There are also some shortcuts that sort automatically by the first column in either ascending or descending order.

Functions

There are many functions you can use in Google Spreadsheets. We'll go over a few valuable ones, but feel free to experiment with them under Insert, Function.

Experiment with
=count(range)
=average(range)
=median(range)
=max(range)
=min(range)

A helpful set of functions have to do with the financial functions. You can figure out payments on a loan or annuity, or get the present or future value. We won't cover here, but feel free to experiment with these on your own.

Payment =pmt(rate, nper,pv,fv,type)
Future Value =fv(rate, nper, pmt, pv, type)
Present Value =pv(rate, nper, pmt)

As you start typing the function, you will see list of potential functions and their options.

Charting

1. Now that we have the data, we can use Excel's charting features to chart it. Let's consider how we'd like to show it. This is a good way to work with the data to fine-tune the story you are hoping to tell. Sometimes trends emerge better with a visual than with numbers. Select the data you want to chart, then choose the Chart tab. Pick the type of chart you want to use.
2. A chart is inserted on the page. You now can format it. You may have to adjust the Chart Type or Source Data. Choose Chart, Source Data to make any adjustments to the data. You can change the Chart Type by choosing Chart Type. You can decide if you want the Chart to be in a new sheet or its own object in the current sheet under Move Chart.
3. Chart Layout lets you adjust how the chart looks. Title, axis, legend, gridines, etc. And if you double-click on part of the graph, you can change other features such as scale, number format, color, etc.
4. You can type in titles or use references to cells. Select the title, type an "=" in the formula bar, click the cell with the title and select enter.
5. We won't be using the Excel charts in our projects, but just using them to help us better understand our data.

Other Excel Features

- You can save multiple spreadsheets in a Workbook. You can see each sheet associated with a workbook as a tab at the bottom. You can reference across spreadsheets. Choose the + to add a new sheet. This is very helpful if you have multiple spreadsheets associated with a project.
- If you want to number a column or row, start with putting 1 and 2 in the cells, then select them and drag. If you had just selected one cell, it would copy the one number to each cell.
- You can copy formulas or just their values. Use Paste Special.
- You can put an if statement in a cell to test for something =if(c1=2012,"yes","no")

- You can use VLookup or HLookup to access data in cells that meets certain criteria.
- =VLOOKUP("apples", A1:C12,2) looks up an item and returns the value of the cell in the array defined by the index in the last item. Notice that if you are indexing a text string, it must be in quotes.
- =HLOOKUP(2012,A1:C11,3)
- Pivot Tables allow you to summarize data. If you have a spreadsheet that lists data in multiple pays, you can summarize by applying a pivot table. The pivot table becomes a new sheet in the Workbook. I will demonstrate.

Places to find datasets (but feel free to find your own):

- US Citizenship and Immigration Data - http://www.uscis.gov
- US Census - https://www.census.gov/data/datasets.html
- Data.gov
- data.world
- Kaggle.com
- Office of Immigration Statistics, US Department of Homeland Security - http://www.uscis.gov/graphics/shared/statistics/index.htm
- Pew Internet Resources - https://www.pewresearch.org/tools-and-resources/
- HealthData.gov https://healthdata.gov/ - some of these are csv or xls.
- City of Austin Data Portal - https://data.austintexas.gov/
- TXST Institutional Research - https://www.ir.txst.edu/student.html

There are many, many others. Use Google and search for datasets on topics that interest you. For now, just try to find datasets that are free and available without having to login.

Additional Functions – Google Spreadsheets

Import Functions
Google Spreadsheet has some very powerful import functions that allow you to essentially scrape data from the Web.
=ImportHTML(url, query, index)

- url – the address of the data
- query – "list" or "table"
- index – the number of the list or table on the page, if there are multiple.

For example:
=IMPORTHTML("https://en.wikipedia.org/wiki/List_of_Academy_Award-winning_films","table", 1)

Type the above code in a Google Spreadsheet and see what happens.

=ImportFeed(url of RSS feed)

=ImportData(url of csv)