

# 3. EXCEL FORMULAS & TABLES

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Winter 2019

# Cell References

- **Absolute reference** - refer to cells by their fixed position.  
e.g.  $=\$A\$2+1$
- **Relative reference** - refer to cell references in formulas in relation to the cell that contains the formula (“the cell two rows above this cell”).  
e.g.  $=A2+1$
- **Combination** - either the row is absolute and the column is relative or the row is relative and the column is absolute. e.g.  $=\$A2+1$  or  $=A\$2+1$

# Example

- Excel adjusts cell references during the fill based on the reference type.

	A	B	C	D	E
1	Year				
2	1				
3	2				
4	3				
5	4				
6	5				

Formula bar: A3 :   *fx* =A2+1

	A	B	C	D	E
1	Year				
2	1				
3	2				
4	2				
5	2				
6	2				

Formula bar: A3 :   *fx* =\$A\$2+1

# Combination Cell References

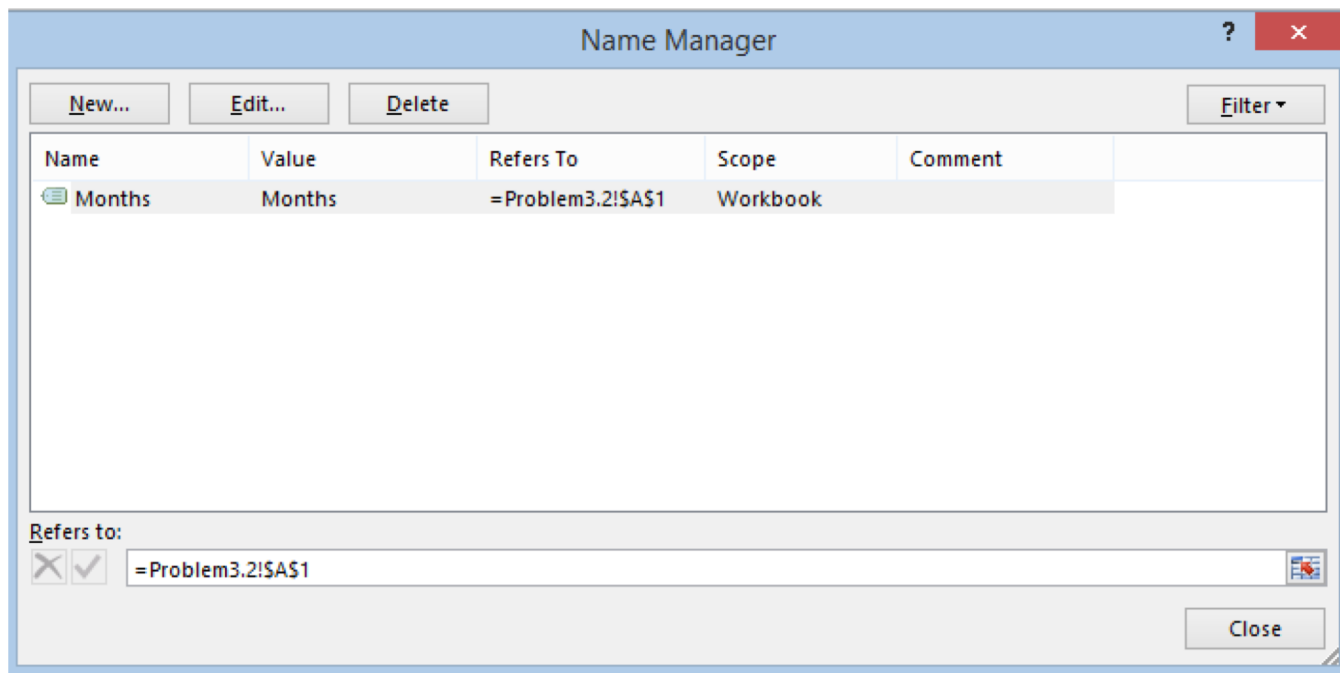
- How do \$A1 and A\$1 differ from \$A\$1?

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
1	4	8	=A1/\$A\$3		
2	6	4	=A\$1*\$B4+B2		
3	=A1+A2	1			
4					
5					

- What formula would result in cell D1 if you copy the formula from cell C1 to D1?
- What formula would result in cell E5 if you copy the formula from C2 to E5?

# Named Cell Reference

- What kind of cell reference is a named cell?



# Problem 3.1

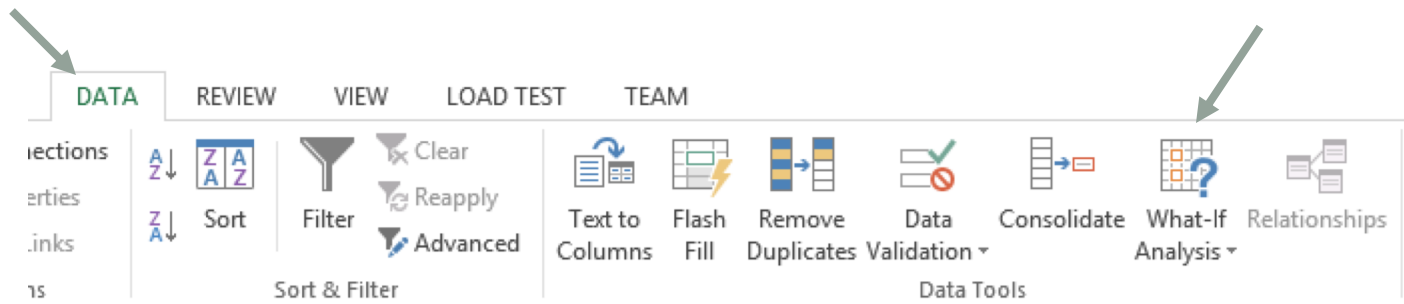
- An interesting Web site is [www.worldometers.info](http://www.worldometers.info)
- Using the population of the world today and the present growth rate of 1.13% per year, design a worksheet that shows the population for each of the next 25 years.
- Let's design and then implement
  - Make sure that the population is stored as a number and that you show the 1000 separator (,)
  - Make sure that percentages are displayed as percentages

# Problem 3.1 Continued

- What is the predicted world population in 2041 if the growth rate is 1.13%?
- What is the predicted world population if the growth rate is 1%?

# What-If Analysis & Goal Seeking

- Using Excel to scrutinize the impact of changing values in cells that are referenced by a formula in another cell is called what-if analysis.



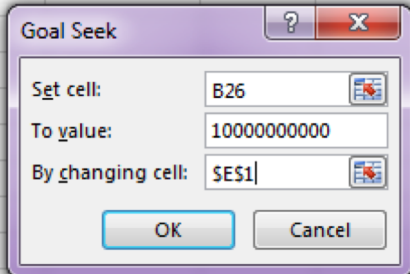


# Goal Seek

- Located under Data->What-If Analysis->Goal Seek
- Goal seek allows you to see how one data item in a formula impacts another.
- Goal seek can be used to answer the question:
  - What growth rate will lead to the population reaching 10 Billion in 2041?

# Goal Seek

	A	B	C	D	E	F
1	2016	7,393,225,210		Growth Rate	1.13%	
2	2017	7,476,768,655				
3	2018	7,561,256,141				
4	2019	7,646,698,335				
5	2020	7,733,106,026				
6	2021	7,820,490,124				
7	2022	7,908,861,663				
8	2023	7,998,231,800				
9	2024	8,088,611,819				
10	2025	8,180,013,132				
11	2026	8,272,447,281				
12	2027	8,365,925,935				
13	2028	8,460,460,898				
14	2029	8,556,064,106				
15	2030	8,652,747,631				
16	2031	8,750,523,679				
17	2032	8,849,404,597				
18	2033	8,949,402,868				
19	2034	9,050,531,121				
20	2035	9,152,802,123				
21	2036	9,256,228,787				
22	2037	9,360,824,172				
23	2038	9,466,601,485				
24	2039	9,573,574,082				
25	2040	9,681,755,469				
26	2041	9,791,159,306				
27						



The Goal Seek dialog box is open, showing the following settings:

- Set cell: B26
- To value: 10000000000
- By changing cell: \$E\$1

Buttons: OK, Cancel

## Problem 3.2

- The university you are planning on attending has given you the following average expenses for a typical student.

	A	B	C	D	E
1	Category	Freshmen	Sophomore	Junior	Senior
2	Room and Board	\$9,047.00			
3	Books and Supplies	\$1,137.00			
4	Personal Expenses	\$1,989.00			
5	Transportation	\$1,073.00			

- Assuming a 3% increase in all expenses from year to year, finish the above worksheet showing expenses for each of your four years in college
- Write **one** formula in cell C1 and fill it down and right

## Problem 3.2 Better Design

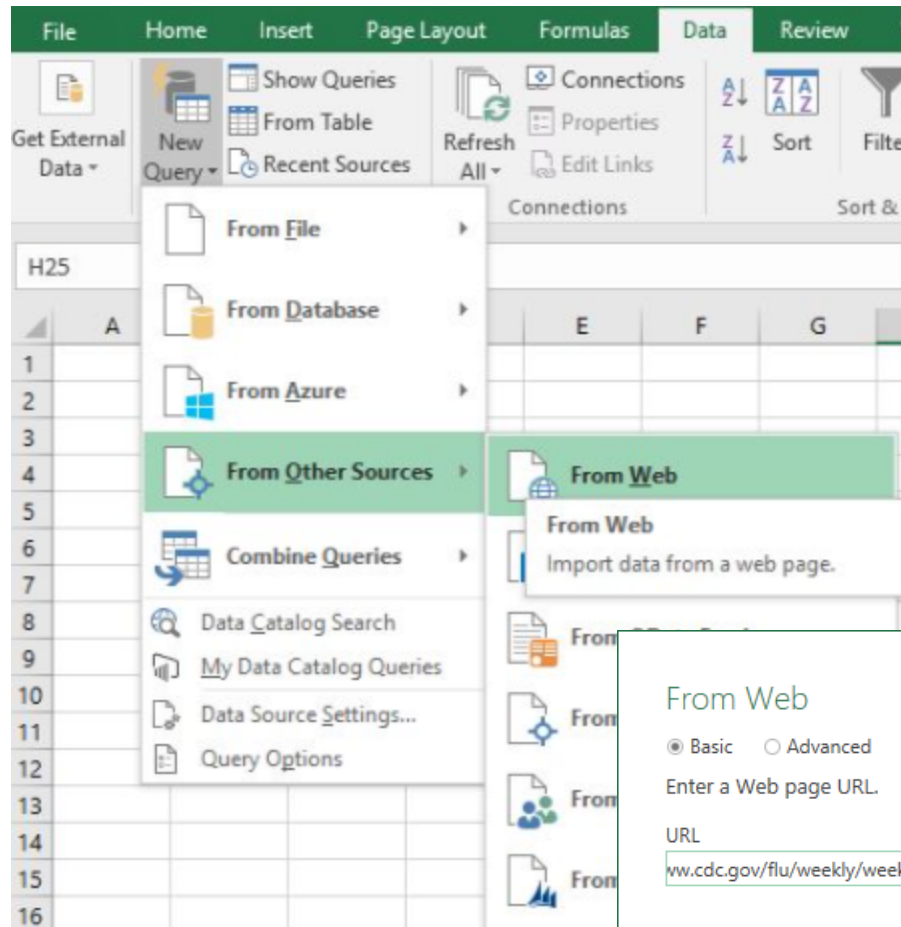
- How would we change the previous worksheet from 3% to 4%?
- Below is a better design:

	A	B	C	D	E	F	G	H
1	Category	Freshmen	Sophomore	Junior	Senior			
2	Room and Board	\$9,047.00					Expense Increase	
3	Books and Supplies	\$1,137.00					4%	
4	Personal Expenses	\$1,989.00						
5	Transportation	\$1,073.00						

# Problem 3.3 Meteorology

- A meteorology class found the average weekly temperature for each week of each month for one year.
- The data is on the next slide. You are to find each of the following using an Excel worksheet:
  - The average monthly temperature for each month.
  - The highest and lowest monthly averages using two functions we have not discussed yet: maximum and minimum. See if you can use the help feature to figure this out.

# Importing Data from Web: Better Way

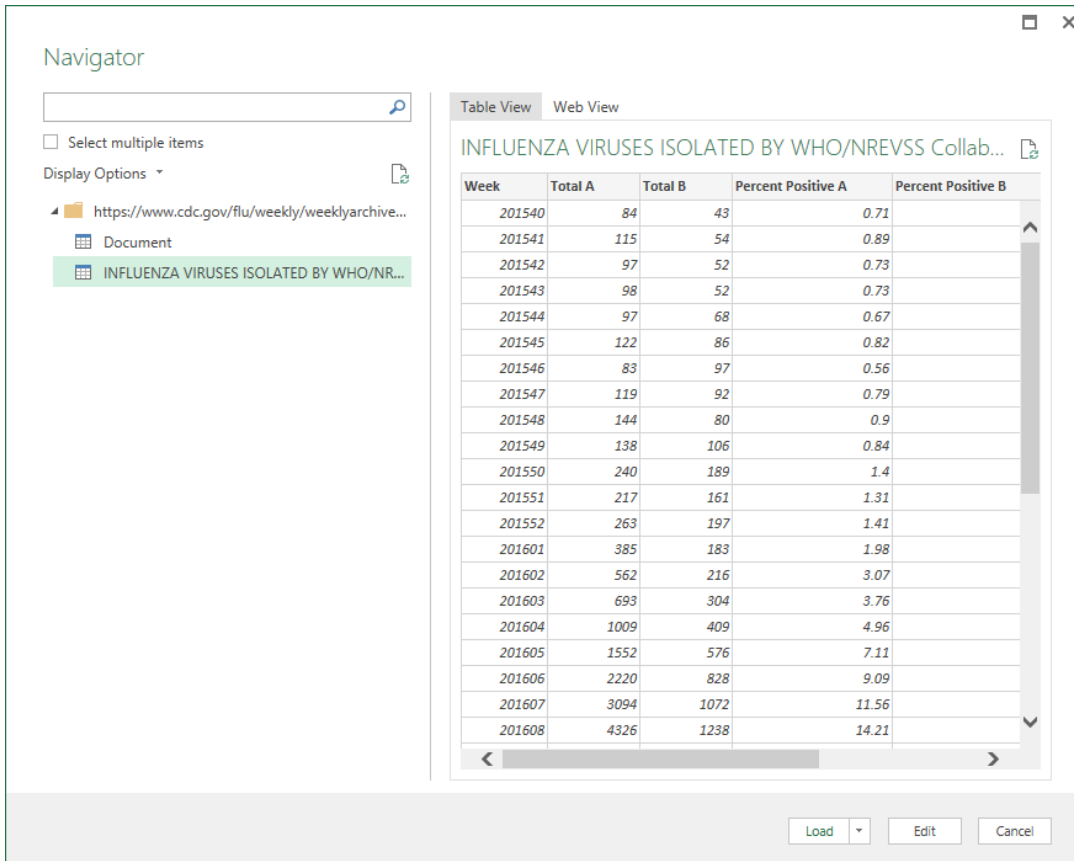


Select Data | New Query  
| From Other Sources |  
From Web

Then enter URL of page  
in dialog box and click  
OK.



# Importing Data from Web, cont.



The screenshot shows a software window titled "Navigator" with a search bar and a list of items. The selected item is "INFLUENZA VIRUSES ISOLATED BY WHO/NR...". The main area displays a table view of this data. The table has columns for "Week", "Total A", "Total B", "Percent Positive A", and "Percent Positive B". The data rows range from week 201540 to 201608.

Week	Total A	Total B	Percent Positive A	Percent Positive B
201540	84	43	0.71	
201541	115	54	0.89	
201542	97	52	0.73	
201543	98	52	0.73	
201544	97	68	0.67	
201545	122	86	0.82	
201546	83	97	0.56	
201547	119	92	0.79	
201548	144	80	0.9	
201549	138	106	0.84	
201550	240	189	1.4	
201551	217	161	1.31	
201552	263	197	1.41	
201601	385	183	1.98	
201602	562	216	3.07	
201603	693	304	3.76	
201604	1009	409	4.96	
201605	1552	576	7.11	
201606	2220	828	9.09	
201607	3094	1072	11.56	
201608	4326	1238	14.21	

At the bottom of the window, there are buttons for "Load", "Edit", and "Cancel".

In the window that opens, you should be able to select the desired data from the list on the left

Click on Load and it should bring this data up in a new worksheet

# Problem 3.3 Meteorology

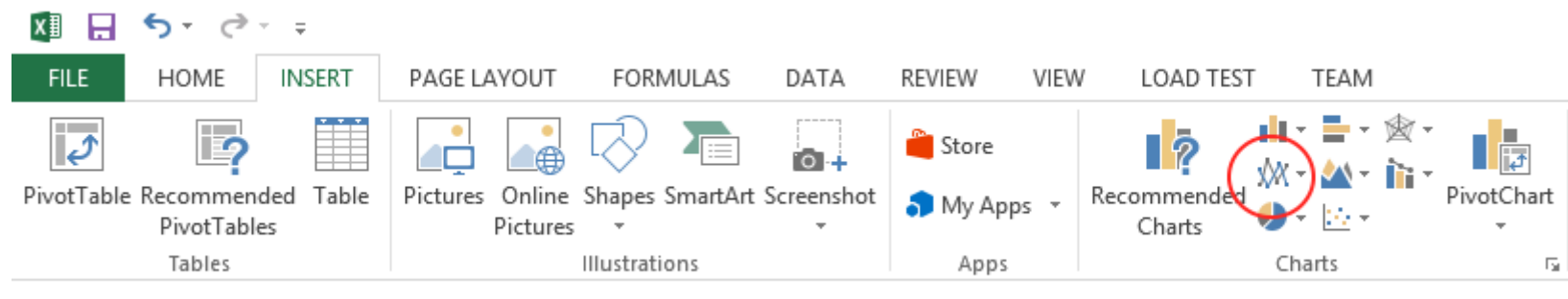
- Let's import the data from the web
- Type in the following URL in the address box:
  - `zeus.cs.pacificu.edu/chadd/cs130w17/WeatherTable.html`



# Importing from the Web

- What are the benefits of importing data from the web?
  - I can easily distribute data to you!
  
- What are the downsides of importing data from the web?

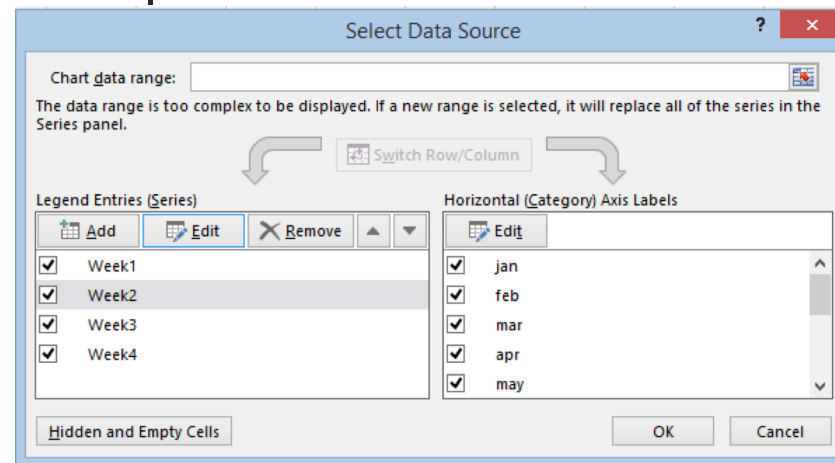
# Problem 3.3 Continued: Charting



- Select columns Month and Week 1
- Choose Insert | Recommended Charts | Line
  - OR select circled icon and the option in upper left of dropdown menu

# Add a new Series

- To add other weeks
  - Right Click on the Chart | Select Data
- Add
- Series Name
- Series Values



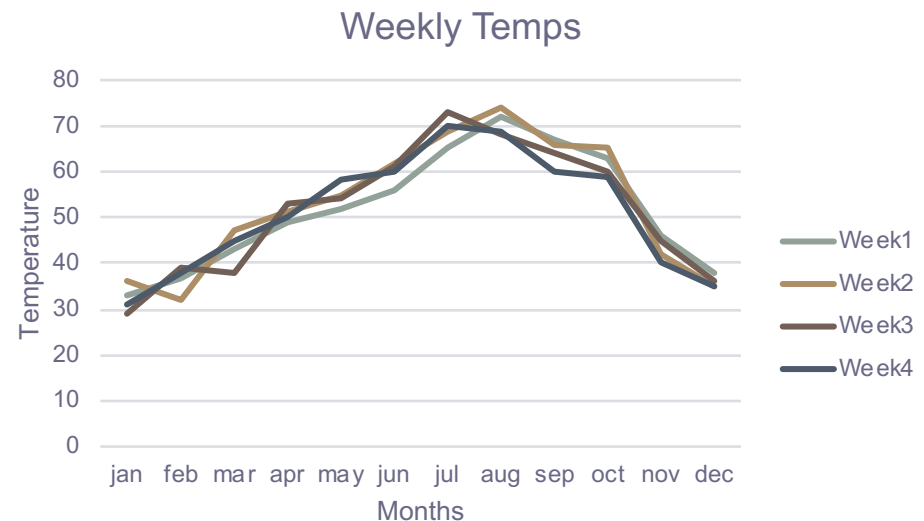
- Edit Horizontal (Category) Axis Labels to show months.

# Format the Chart



- Click on Chart -> Design | Add chart Element

- Axis Titles
- Chart Title
- Legend | Right



# Outside Practice

- Import the table from <http://www.opensecrets.org/bigpicture/index.php?display=P>
  - Format the data nicely
  - Add a row that calculates the average the columns containing monetary values.
  - Add a row to calculate the median of those same columns.
  - Add a column that shows how much more (in \$) Democrats spent than Republicans each year. This number may be negative.

# Outside Practice Continued

- Build a line chart that displays this data. The chart should have one line for Democrats and one line for Republicans.

