Day 20 - Excel

- Motivation
- Inserting rows and columns
- Average
- Formatting cells
- More complicated formulas
- Plotting
- (Exercises)

Motivation

Today we'll take a brief break from Matlab and learn how to do some of the same tasks in Excel.

Both Matlab and Excel are frequently used in engineering.

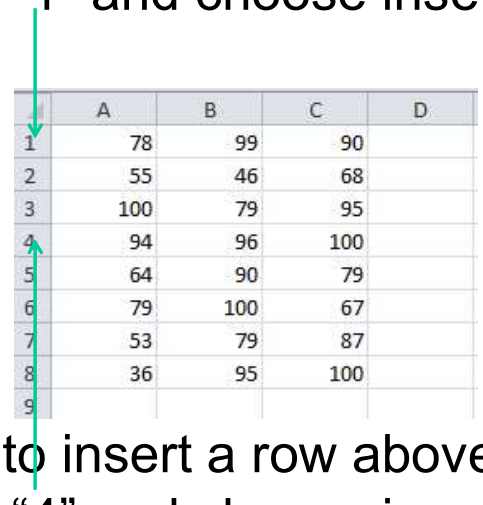
Inserting rows and columns

Suppose we open a small Excel spreadsheet, and it contains this data:

	A	B	C	D
1	78	99	90	
2	55	46	68	
3	100	79	95	
4	94	96	100	
5	64	90	79	
6	79	100	67	
7	53	79	87	
8	36	95	100	
9				

Inserting rows and columns

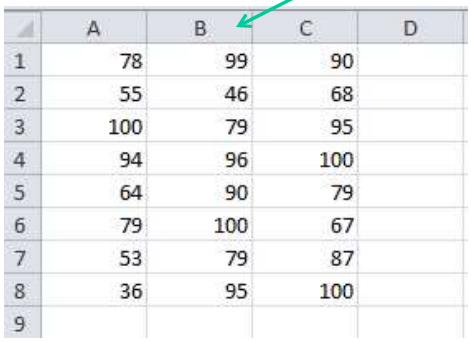
To insert a row above the current row 1, right-click on the “1” and choose insert.



If you want to insert a row above row 4, right-click on the “4” and choose insert

Inserting rows and columns

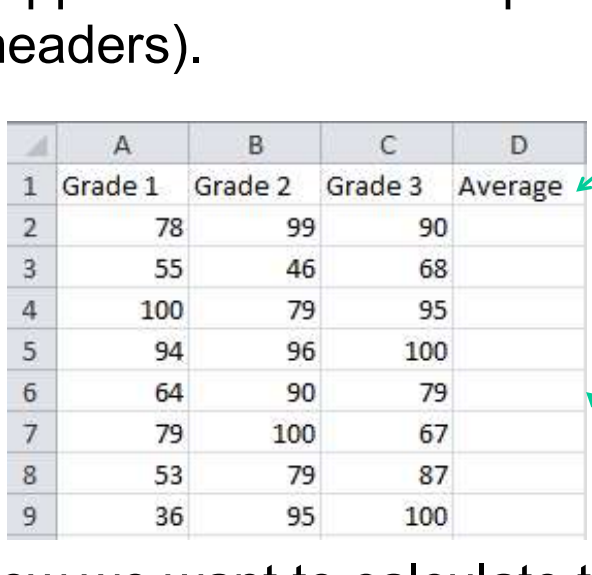
To insert a column to the left of the current column B, right-click on the “B” and choose insert.



	A	B	C	D
1	78	99	90	
2	55	46	68	
3	100	79	95	
4	94	96	100	
5	64	90	79	
6	79	100	67	
7	53	79	87	
8	36	95	100	
9				

Average

Suppose we insert a top row and add text (headers).

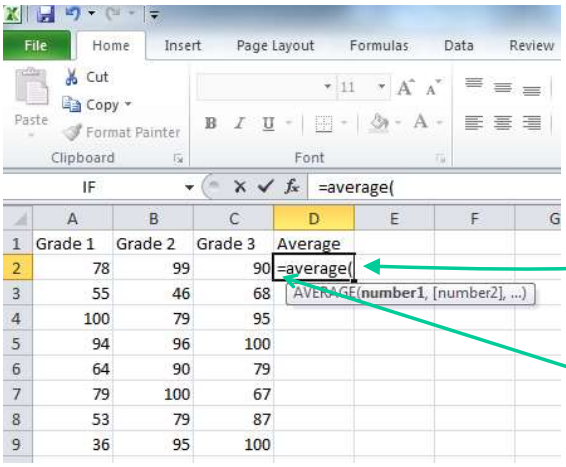


	A	B	C	D
1	Grade 1	Grade 2	Grade 3	Average
2	78	99	90	
3	55	46	68	
4	100	79	95	
5	94	96	100	
6	64	90	79	
7	79	100	67	
8	53	79	87	
9	36	95	100	

Now we want to calculate the average grades.

Average

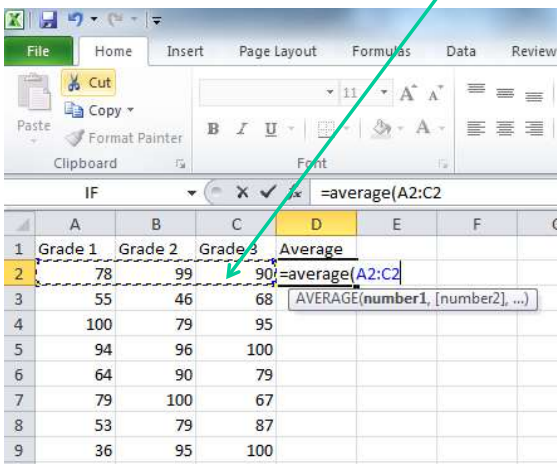
Start typing `=average(` in the first cell in the column.



Don't forget the = sign! This tells Excel it is a formula.

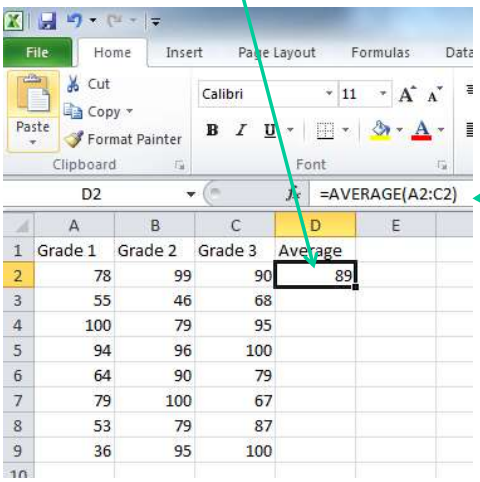
Average

Now highlight the cells you want to average and press Enter



Average

The average appears in the cell.



	A	B	C	D	E
1	Grade 1	Grade 2	Grade 3	Average	
2	78	99	90	89	
3	55	46	68		
4	100	79	95		
5	94	96	100		
6	64	90	79		
7	79	100	67		
8	53	79	87		
9	36	95	100		

Notice that the formula and the cells are called out here.

If you made a mistake you can edit it.

Average

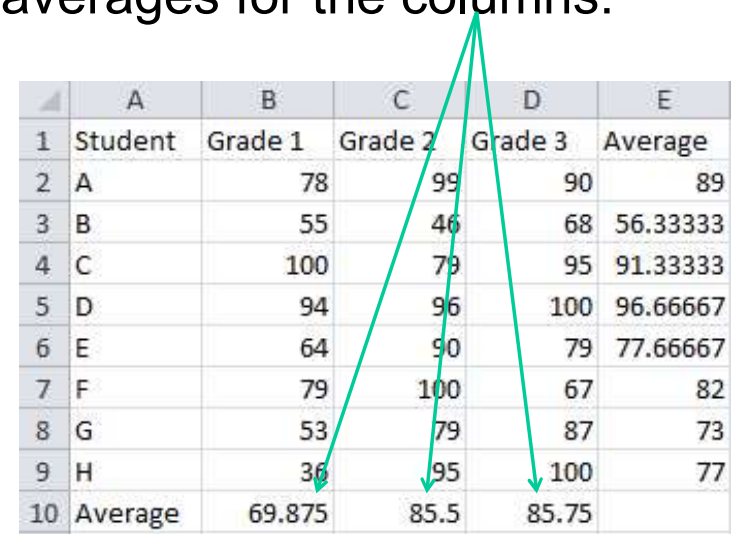
Right-click on the first cell to copy it.

Paste it into the other cells in column D (all other cells at once). Excel adjusts the formula appropriately for all rows:

	A	B	C	D
1	Grade 1	Grade 2	Grade 3	Average
2	78	99	90	89
3	55	46	68	56.33333
4	100	79	95	91.33333
5	94	96	100	96.66667
6	64	90	79	77.66667
7	79	100	67	82
8	53	79	87	73
9	36	95	100	77

Average

We can take a similar approach to include the averages for the columns:



	A	B	C	D	E
1	Student	Grade 1	Grade 2	Grade 3	Average
2	A	78	99	90	89
3	B	55	46	68	56.33333
4	C	100	79	95	91.33333
5	D	94	96	100	96.66667
6	E	64	90	79	77.66667
7	F	79	100	67	82
8	G	53	79	87	73
9	H	36	95	100	77
10	Average	69.875	85.5	85.75	

Average

`average` is just one of many functions.

Others:

`sum`

`max`

`min`

`median`

`stdev` (standard deviation)

Formatting cells

To adjust the format of the numbers, select all of the cells you want to format and right-click. Choose “Format cells…” and select an appropriate format.

	A	B	C	D	E
1	Student	Grade 1	Grade 2	Grade 3	Average
2	A	78	99	90	89.0
3	B	55	46	68	56.3
4	C	100	79	95	91.3
5	D	94	96	100	96.7
6	E	64	90	79	77.7
7	F	79	100	67	82.0
8	G	53	79	87	73.0
9	H	36	95	100	77.0
10	Average	69.9	85.5	85.8	

Now only 1 decimal place

More complicated formulas

We can also enter more complicated formulas that refer to specific cells.

	A	B	C	D	E
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)
2	A	78	150	90	
3	B	55	165	68	
4	C	100	97	95	
5	D	94	198	100	
6	E	64	170	79	
7	F	79	183	67	
8	G	53	192	87	
9	H	36	145	100	
10					
11	Points	100	200	100	

We want the percentage out of the total number of points for each Grade, then averaged

More complicated formulas

	A	B	C	D	E	F	G
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)		
2	A	78	150	90	=(B2/B11+C2/C11+D2/D11)/3		
3	B	55	165	68			
4	C	100	97	95			
5	D	94	198	100			
6	E	64	170	79			
7	F	79	183	67			
8	G	53	192	87			
9	H	36	145	100			
10							
11	Points	100	200	100			

More complicated formulas

	A	B	C	D	E
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)
2	A	78	150	90	81.0%
3	B	55	165	68	
4	C	100	97	95	
5	D	94	198	100	
6	E	64	170	79	
7	F	79	183	67	
8	G	53	192	87	
9	H	36	145	100	
10					
11	Points	100	200	100	

Result, formatted as “Percentage”

More complicated formulas

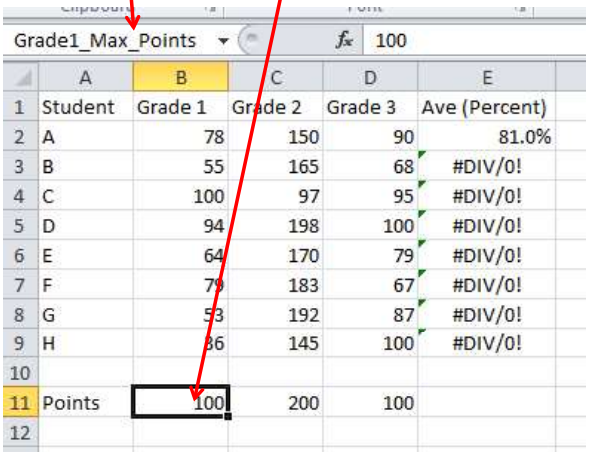
When we try to copy this formula to the other cells we run into trouble.

	A	B	C	D	E
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)
2	A	78	150	90	81.0%
3	B	55	165	68	#DIV/0!
4	C	100	97	95	#DIV/0!
5	D	94	198	100	#DIV/0!
6	E	64	170	79	#DIV/0!
7	F	79	183	67	#DIV/0!
8	G	53	192	87	#DIV/0!
9	H	36	145	100	#DIV/0!
10					
11	Points	100	200	100	

Excel doesn't know to use B11 and C11 and D11 each time. We can fix this.

More complicated formulas

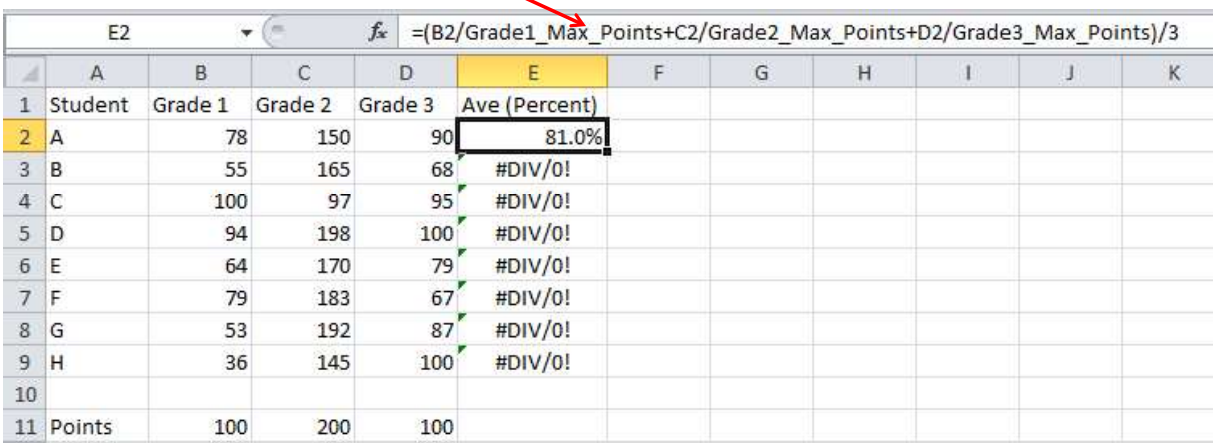
Click on the B11 cell. Change its name in the name box. (Use a good variable name.) Also rename C11 and D11.



	A	B	C	D	E
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)
2	A	78	150	90	81.0%
3	B	55	165	68	#DIV/0!
4	C	100	97	95	#DIV/0!
5	D	94	198	100	#DIV/0!
6	E	64	170	79	#DIV/0!
7	F	79	183	67	#DIV/0!
8	G	53	192	87	#DIV/0!
9	H	36	145	100	#DIV/0!
10					
11	Points	100	200	100	
12					

More complicated formulas

Change the formula to use the new variable names



E2 =(B2/Grade1_Max_Points+C2/Grade2_Max_Points+D2/Grade3_Max_Points)/3

	A	B	C	D	E	F	G	H	I	J	K
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)						
2	A	78	150	90	81.0%						
3	B	55	165	68	#DIV/0!						
4	C	100	97	95	#DIV/0!						
5	D	94	198	100	#DIV/0!						
6	E	64	170	79	#DIV/0!						
7	F	79	183	67	#DIV/0!						
8	G	53	192	87	#DIV/0!						
9	H	36	145	100	#DIV/0!						
10											
11	Points	100	200	100							

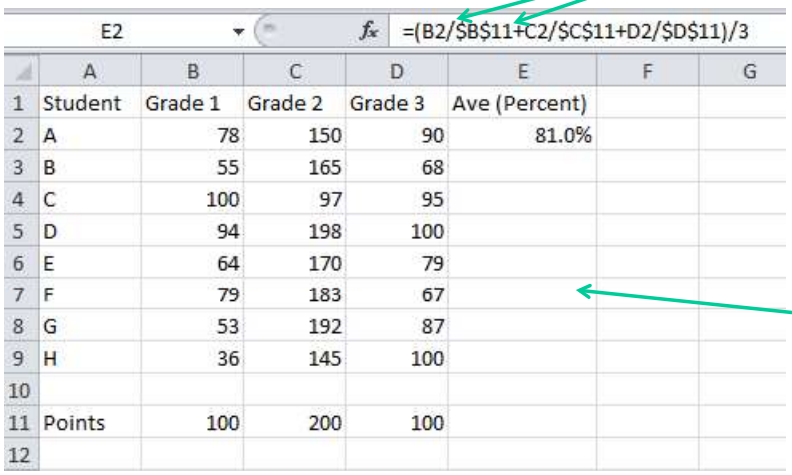
More complicated formulas

Now when you copy the formula down the column, Excel knows not to change that reference. Everything is fine now.

	A	B	C	D	E
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)
2	A	78	150	90	81.0%
3	B	55	165	68	68.5%
4	C	100	97	95	81.2%
5	D	94	198	100	97.7%
6	E	64	170	79	76.0%
7	F	79	183	67	79.2%
8	G	53	192	87	78.7%
9	H	36	145	100	69.5%
10					
11	Points	100	200	100	

More complicated formulas

An alternate way to hold a cell reference fixed: Don't rename the cell but use `$` in the cell reference.



E2 | =(B2/$B$11+C2/$C$11+D2/$D$11)/3

	A	B	C	D	E	F	G
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)		
2	A	78	150	90	81.0%		
3	B	55	165	68			
4	C	100	97	95			
5	D	94	198	100			
6	E	64	170	79			
7	F	79	183	67			
8	G	53	192	87			
9	H	36	145	100			
10							
11	Points	100	200	100			
12							

Notice that we have two: `$B$11`

This will also copy down the column just fine.

Plotting

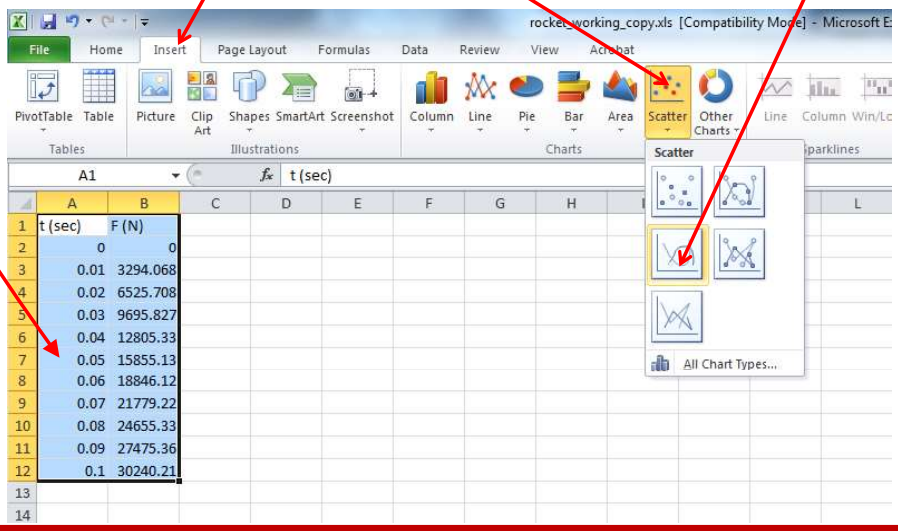
Suppose we have two columns of data, and we want to plot column A on the x axis and column B on the y axis:

	A	B
1	t (sec)	F (N)
2	0	0
3	0.01	3294.068
4	0.02	6525.708
5	0.03	9695.827
6	0.04	12805.33
7	0.05	15855.13
8	0.06	18846.12
9	0.07	21779.22
10	0.08	24655.33
11	0.09	27475.36
12	0.1	30240.21
13		

Plotting

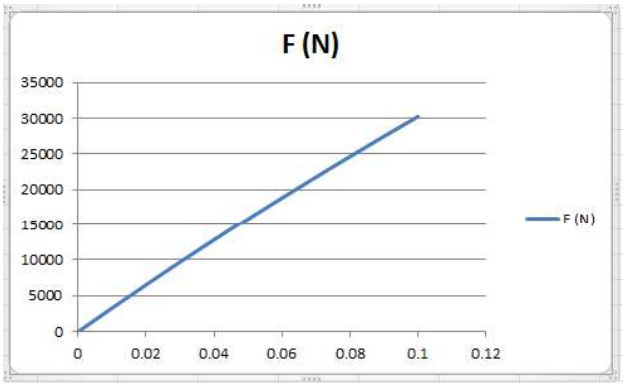
Highlight the two columns of data.

Pick Insert → Scatter → Smooth Line



Plotting

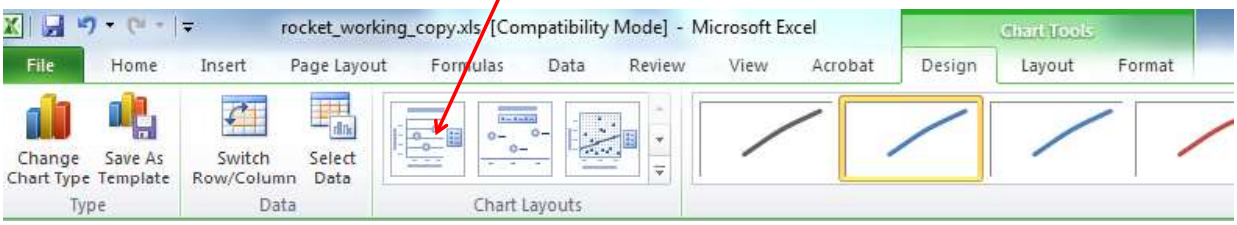
A plot pops up. (Apparently the data is boring.)



This plot is not acceptable yet because it has a poor title and no axis labels.

Plotting

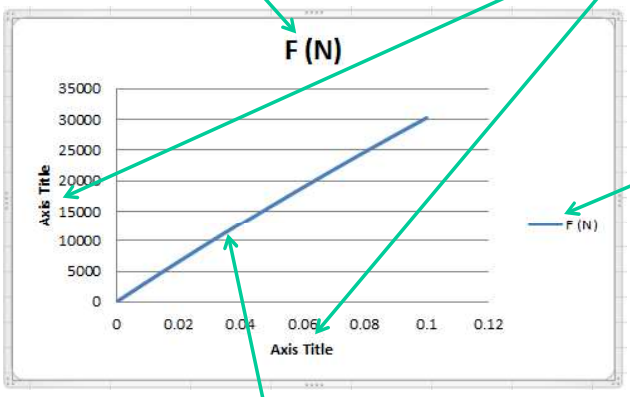
Click on the “Chart” (the plot). On “Chart Layouts” choose a layout that has spots for a title and axis labels. (It is ok if it has a legend, we can get rid of that later.)



Plotting

Click on the chart title and change the words.

Click on the axis titles and change the words.

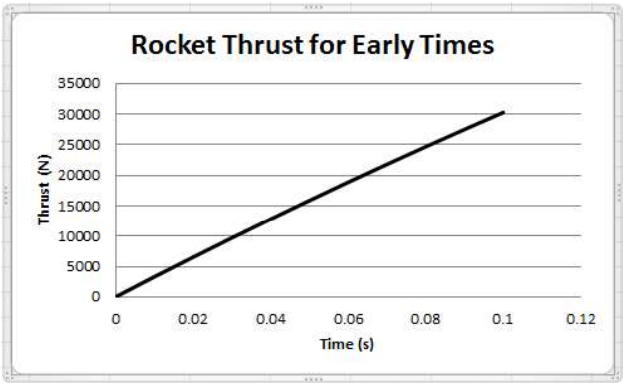


Click on the legend and delete it (you should not have a legend for just one curve).

Right-click on the curve itself to change the color

Plotting

Appropriate Plot.



Print the plot by clicking on the plot and then selecting File→Print.