# Day 20 - Excel

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

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**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.

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

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

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#### Inserting rows and columns

To insert a row above the current row 1, rightclick on the "1" and choose insert.

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

If you want to insert a row above row 4, rightclick 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.

1	A	В	С	D
1	78	99	90	
1 2 3	55	46	68	
3	100	79	95	
4 5	94	96	100	
5	64	<mark>9</mark> 0	79	
6	79	100	67	
7	53	79	87	
8	36	95	100	
9				

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#### Average

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

24	А	В	С	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.

Pa	Ste		BIU		• A A			
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-	IF	•						
1	A Grade 1	B	C	D	E	F	G	
1			Grade 3	Average				
2	78 55			=average(	(number1, [	numphar 21		
э Л	100				number1, [	nunitetz],		
3 4 5 6 7	94	96						
6	64							
7	79							Don't forget the = si
8	53							•
8	36							This tells Excel it is
								formula.

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#### Average

Now highlight the cells you want to average and press Enter

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	IF		(= x v	/x =8	verage(A2:	C2	
	A	В	c	D	E	F	0
1	Grade 1	Grade 2	Grade 3	Average	e		
2	78	99	<b>1</b> 90	=averag	ge(A2:C2		
3	55	46	68	AVERA	AGE(number1	, [number2]	,)
4	100	79	95				
5	94	96	100				
б	64	90	79				
7	79	100	67				
8	53	79	87				
9	36	95	100				

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# The average appears in the cell.

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	D2		• (**	J: =AVE	RAGE(A2:C2)
A	A	В	С	D	E
1	Grade 1	Grade 2	Grade 3	Average	
2	78	99	90	89	
3	55	46	68	83	
4	100	79	95		
5	94	96	100		
6	64	90	79		
7	79	100	67		
8	53	79	87		
9	36	95	100		
10					

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#### 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	A	В	С	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	A	В	С	П	D	E
1	Student	Grade 1	Grade 2	G	ade 3	Average
2	A	78	99		90	89
3	В	55	46		68	56.33333
4	С	100	79		95	91.33333
5	D	94	96		100	96.66667
б	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	

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#### Average

average is just one of many functions.

Others:
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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	A	В	С	D	E	
1	Student	Grade 1	Grade 2	Grade 3	Average	
2	A	78	99	90	89.0	Now only 1
3	В	55	46	68	56.3	decimal plac
4	С	100	79	95	91.3	deemiai piac
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	н	36	95	100	77.0	
10	Average	69.9	85.5	85.8	×	

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#### More complicated formulas

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

1	A	В	С	D	E	We want the
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)	
2	A	78	< <u>− 150</u>	90		percentage out of
3	В	55	165	68		the total number of
4	С	100	97			noints for anoth
5	D	94	198	100		points for each
6	E	64	170	79		Grade, then
7	F	79	183	67		averaged
8	G	53	192	87		averagea
9	н	36	145	100		
10			/			
11	Points	100	200	100		

# More complicated formulas

M	A	В	С	D	E	F	G
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)		
2	А	78	150	90	=(B2/B11+C2/C1	1+D2/D1	1)/3
3	В	55	165	68			
4	С	100	97	95			
5	D	94	198	100			
6	E	64	170	79			
7	F	79	183	67			
8	G	53	192	87			
9	н	36	145	100			
10							
11	Points	100	200	100			
10		1	1. St. 1. St		-		

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# More complicated formulas

1	A	В	C	D	E
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)
2	A	78	150	90	81.0%
3	В	55	165	68	
4	С	100	97	95	
5	D	94	198	100	
6	E	64	170	79	
7	F	79	183	67	
8	G	53	192	87	
9	н	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.

Å	А	В	C	D	E	
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)	
2	А	78	150	90	81.0%	
3	В	55	165	68	#DIV/0!	
4	с	100	97	95	#DV/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	н	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.

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#### 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.

	Cilhaoai	14 I			1 UIIL				
Gr	ade1_Max	Points 🔻	Points 👻 🕐			100			
1	A	В		С	D		E		
1	Student	Grade 1	Gra	de 2	Gra	de 3	Ave (Percent)		
2	A	78		150	90		81.0%		
3	В	55		165		68	#DIV/0!		
4	С	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	н	86		145	100		#DIV/0!		
10									
11	Points	100		200		100			
12			1						

# More complicated formulas

# Change the formula to use the new variable names

	E2		• (=	<i>f</i> <sub>x</sub> =(B2	/Grade1_Max_Po	ints+C2/	Grade2_M	ax_Points+	D2/Grade	B_Max_Poi	nts)/3
A	A	В	С	D	E	F	G	н	1	J	K
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)						
2	A	78	150	90	81.0%						
3	В	55	165	68	#DIV/0!						
4	С	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	н	36	145	100	#DIV/0!						
10											
11	Points	100	200	100							

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#### More complicated formulas

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

1	A	В	С	D	E
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)
2	А	78	150	90	81.0%
3	В	55	165	68	68.5%
4	С	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	н	36	145	100	69.5%
10					
11	Points	100	200	100	

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

	E2		. (*	<i>f</i> <sub>x</sub> =(B2	/\$B\$11+C2/\$C\$11	+D2/\$D\$	\$11)/3	Notice that we
1	A	В	C	D	E	F	G	have two: \$B\$11
1	Student	Grade 1	Grade 2	Grade 3	Ave (Percent)			
2	A	78	150	90	81.0%			
3	В	55	165	68				
4	С	100	97	95				
5	D	94	198	100				<b>This set11 slass</b>
6	E	64	170	79				This will also
7	F	79	183	67	4			copy down the
8	G	53	192	87				
9	н	36	145	100				column just
10	-							fine.
11	Points	100	200	100				
12								

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#### 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:

1	A	В
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

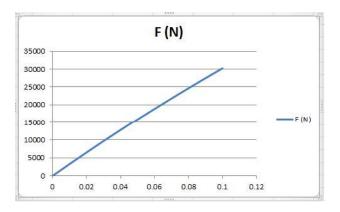
Highlight the two columns of data. Pick Insert  $\rightarrow$  Scatter  $\rightarrow$  Smooth Line

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· di	А	В	С	D	E	F	G	Н	1	· · · ·	2	L
1	t (sec)	F (N)										
2	0	Second Second									Se l	
3		3294.068									0.0	
4	122000	6525.708 9695.827								1		
6		12805.33							_	PX		
7		15855.13								All Chart T		
8		18846.12							1	All Chart I	ypes	ł
9	0.07	21779.22										
10	0.08	24655.33										
11	0.09	27475.36										
12	0.1	30240.21										
13												
14												

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# 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.

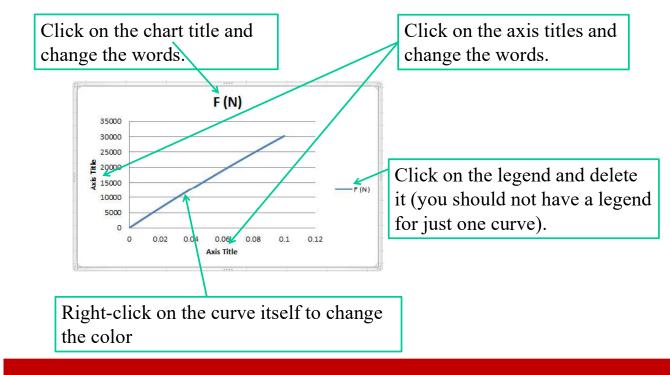
# Plotting

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.)

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	Template	Row/Colum										
Тур	e	Dat	a	Chart	Layouts							

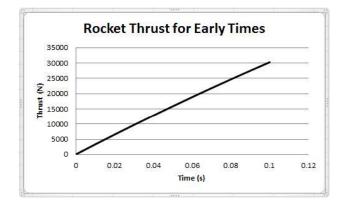
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### Plotting



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# Appropriate Plot.



Print the plot by clicking on the plot and then selecting File $\rightarrow$ Print.

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