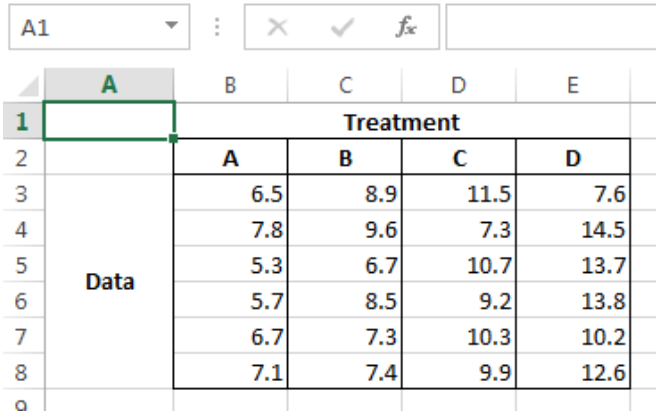
ANOVA tests with the Analysis ToolPak

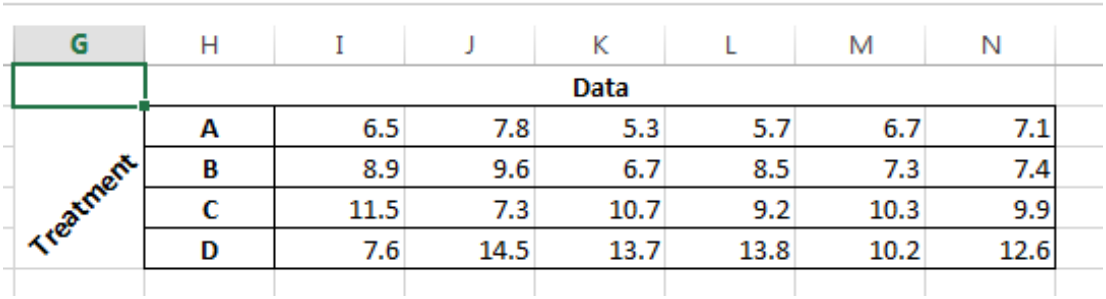
Excel 2013, PC

As with any statistical analysis in Excel, the first step is to enter your data into the spreadsheet in a logical fashion. For this guide, the data is separated by treatment, and each treatment is entered into a different column.



	A	B	C	D	E
1		Treatment			
2		A	B	C	D
3	Data	6.5	8.9	11.5	7.6
4		7.8	9.6	7.3	14.5
5		5.3	6.7	10.7	13.7
6		5.7	8.5	9.2	13.8
7		6.7	7.3	10.3	10.2
8		7.1	7.4	9.9	12.6

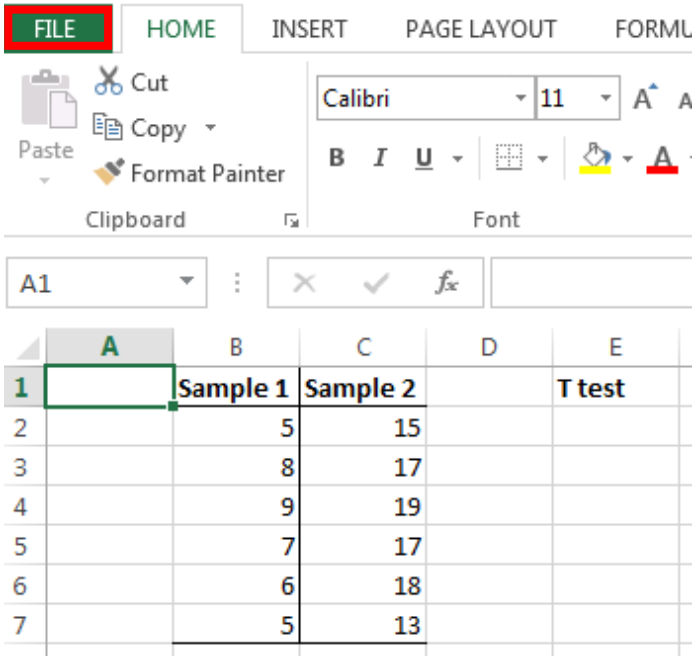
It would be just as correct to lay out your data as seen below, too, by row as long as each treatment's data is collected together in a single series of cells.



	G	H	I	J	K	L	M	N
1		Data						
2	Treatment	A	6.5	7.8	5.3	5.7	6.7	7.1
3		B	8.9	9.6	6.7	8.5	7.3	7.4
4		C	11.5	7.3	10.7	9.2	10.3	9.9
5		D	7.6	14.5	13.7	13.8	10.2	12.6

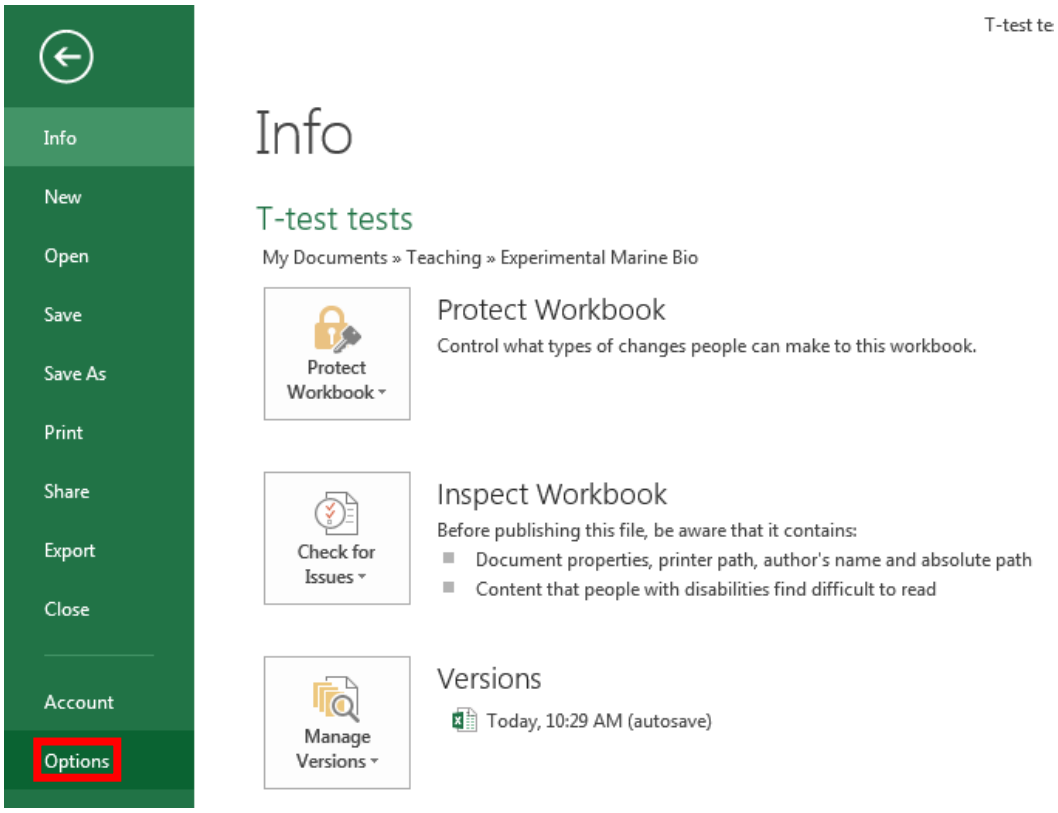
To perform an ANOVA test (which stands for ANalysis Of VAriance), you need to click on the "Data" ribbon. Then select the option all the way to the right that says "Data Analysis." If the Data Analysis button does not appear on your ribbon, you need to activate the Analysis ToolPak in Excel's Options menu.

To make sure the Analysis ToolPak add-in is activated, click FILE.

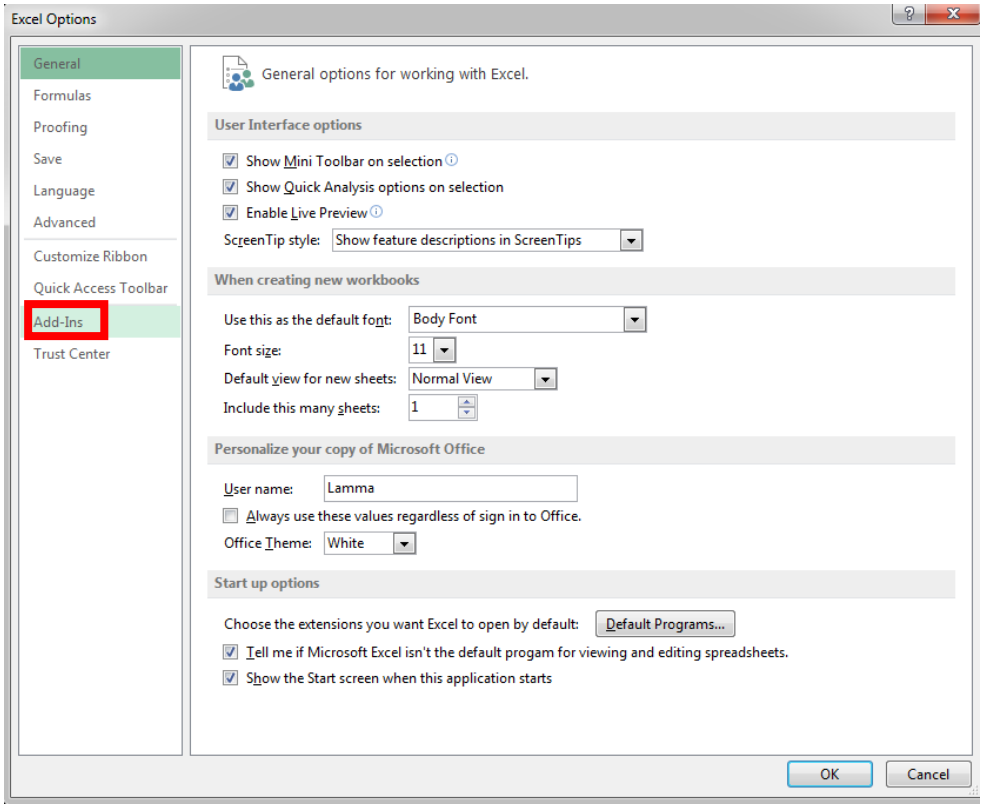


	A	B	C	D	E
1		Sample 1	Sample 2		T test
2		5	15		
3		8	17		
4		9	19		
5		7	17		
6		6	18		
7		5	13		

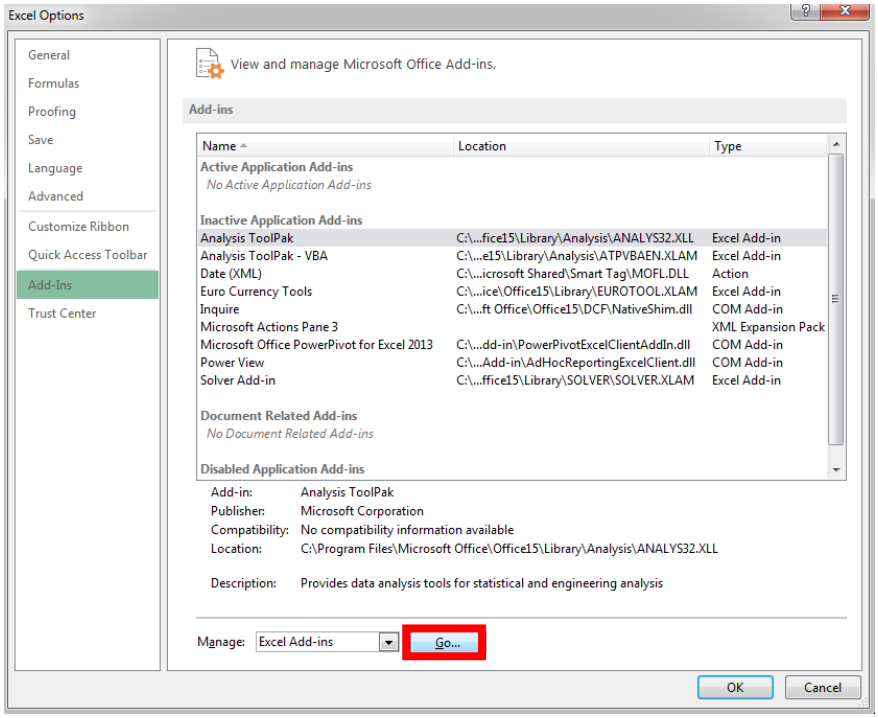
At the bottom of the File menu, select Options.



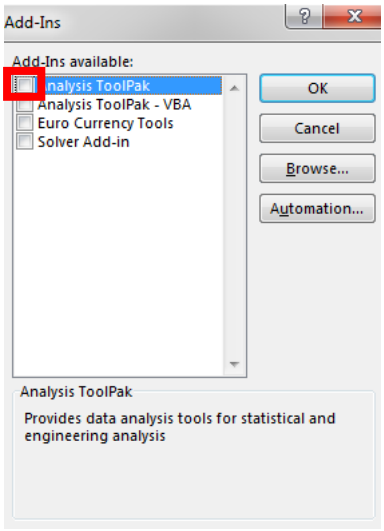
When the Excel Options box pops up, click Add-Ins on the left side menu.

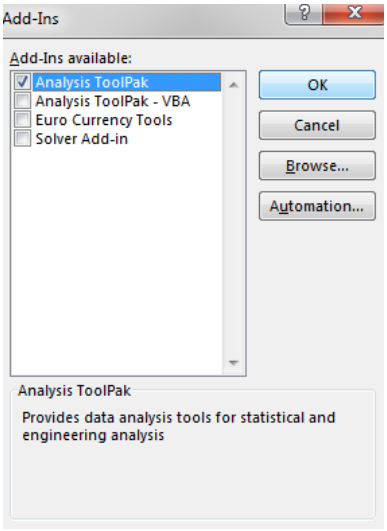


Within the Add-Ins section of the Excel Options menu, click Go at the bottom next to where it says “Manage Excel Add-ins”

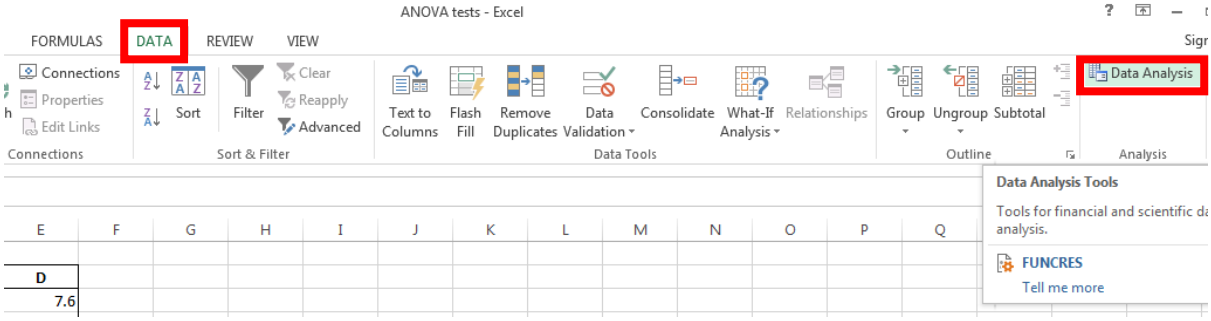


In the next menu that pops up, make sure that the box next to Analysis ToolPak is checked, then click OK

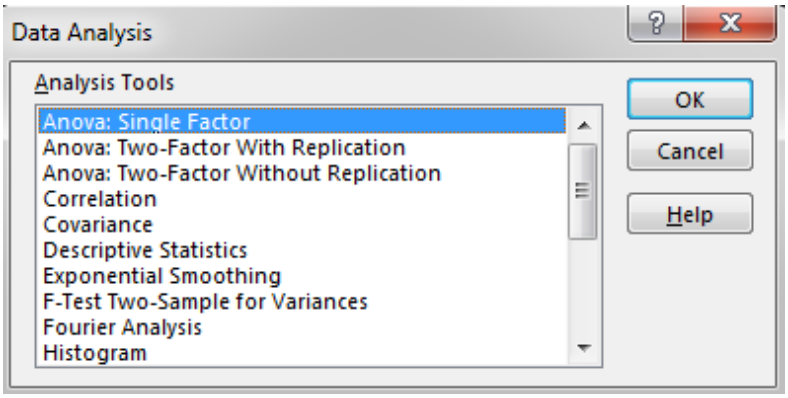




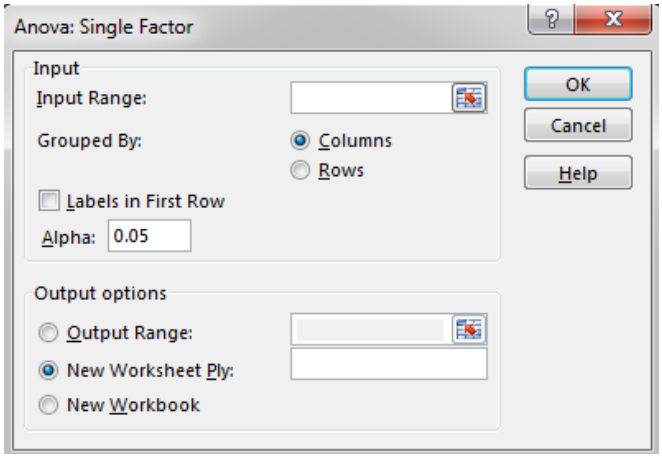
Activating the add-in means that now when you go to the Data ribbon, you'll see an option "Data Analysis" available on the right hand side.



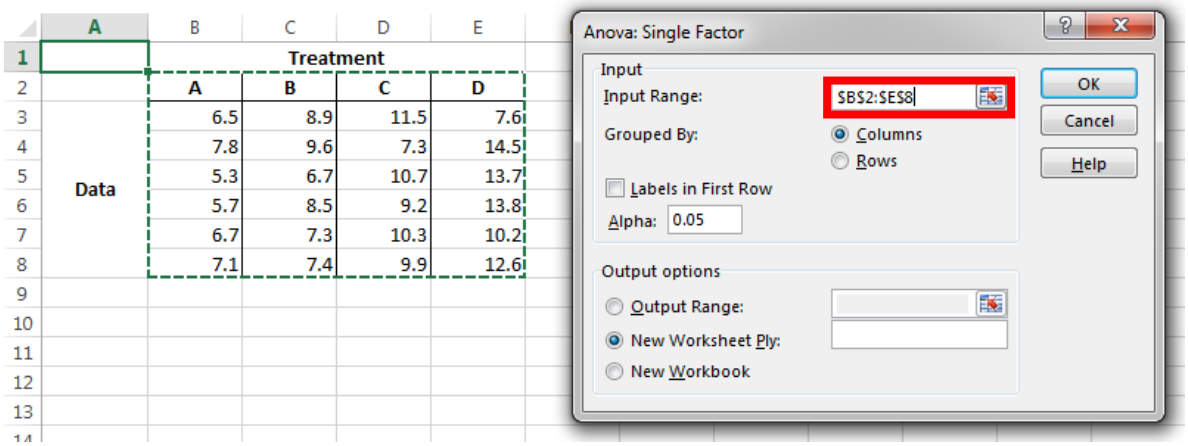
When the Data Analysis menu pops up, you need to choose which test you would like to use on the data. Since these treatments are only testing a single variable's effect on the subjects, select the first option, "Anova: Single Factor," and click OK.



This will prompt another menu to appear where you select which cells in the spreadsheet make up your dataset and enter other test parameters.



First, after placing your cursor in the empty box next to “Input Range:” highlight all of the data for all of the treatments.



	A	B	C	D	E
1		Treatment			
2		A	B	C	D
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4		7.8	9.6	7.3	14.5
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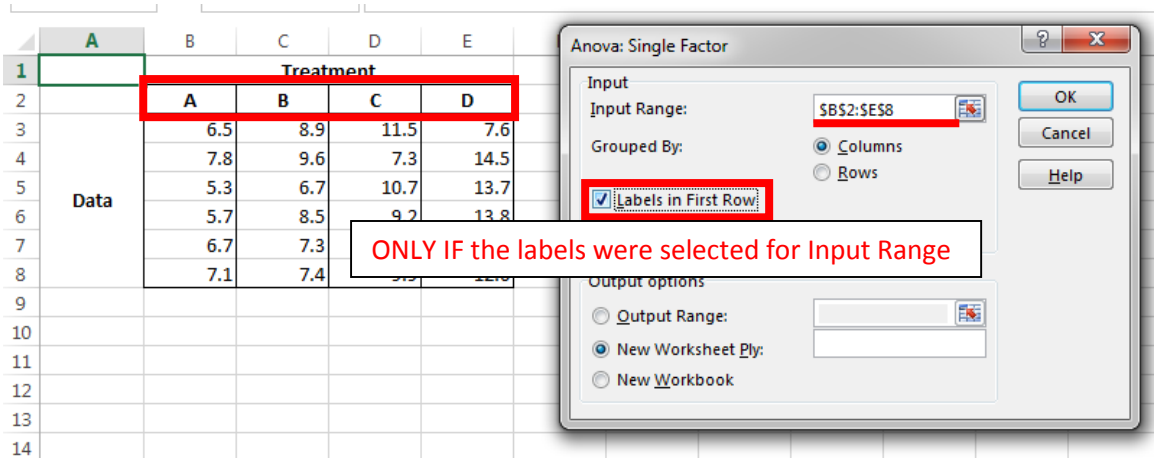
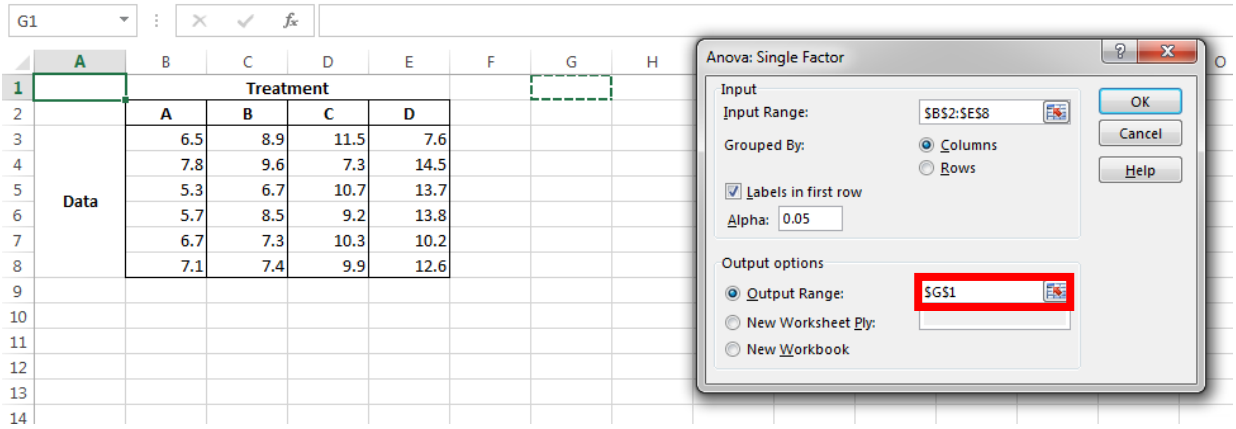
6		5.7	8.5	9.2	13.8
7		6.7	7.3	10.3	10.2
8		7.1	7.4	9.9	12.6
9					
10					
11					
12					
13					

If your data is arranged in columns the way this guide is organized, leave the “Columns” option checked for the “Grouped By:” selection. If you arranged your data by rows (as shown in the second figure of this guide), check “Rows” instead.

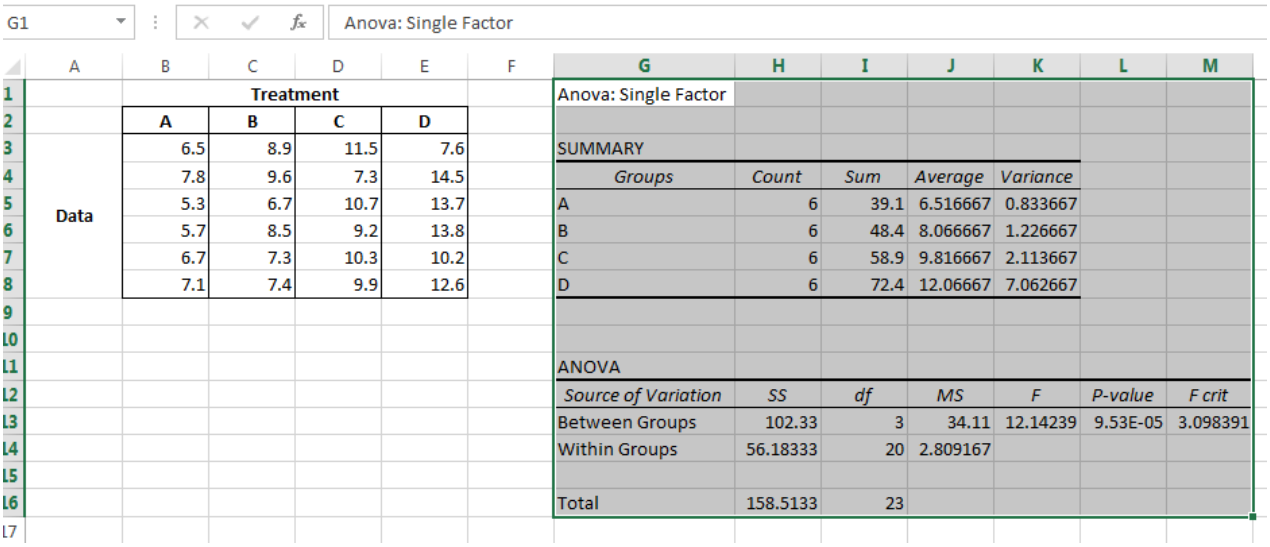
In this guide the labels for each treatment (A,B,C, and D) were highlighted along with the numbers when selecting the Input Range. Since this is the case, “Labels in First Row” needs to be selected because the first row is not actually data. It is usually easier to select only the numbers and leave this box unchecked, but if you are interested in the summary statistics of each group, this method will label each group’s results for you when the ANOVA results appear.



"Alpha:" can be left at the default of 0.05 (so we only judge p-values *lower than 0.05* significant), and "Output options:" can be changed as desired. The default option places your results in a new sheet, and in this example a cell next to the data is chosen as the place the results will appear.



When you click OK, your ANOVA results appear wherever you specified!



	A	B	C	D
	Treatment			
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	7.1	7.4	9.9	12.6

Anova: Single Factor

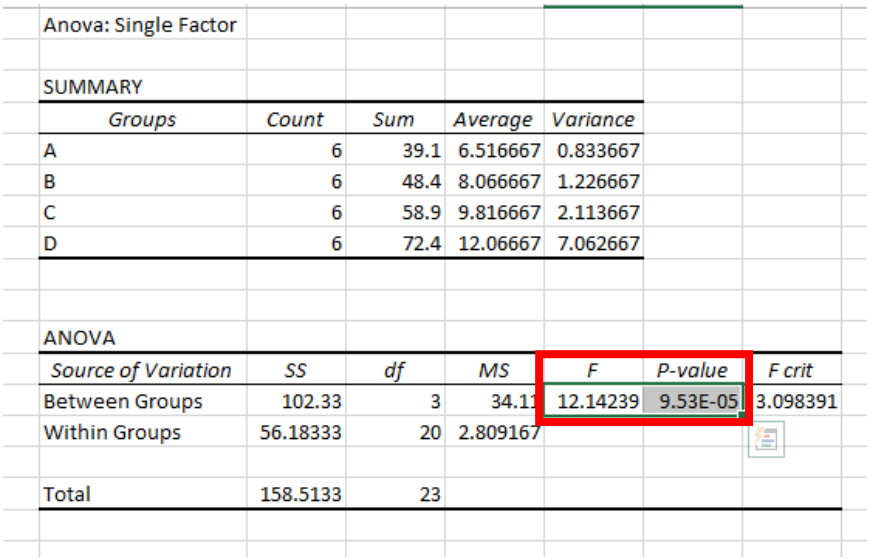
SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
A	6	39.1	6.516667	0.833667
B	6	48.4	8.066667	1.226667
C	6	58.9	9.816667	2.113667
D	6	72.4	12.06667	7.062667

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	102.33	3	34.11	12.14239	9.53E-05	3.098391
Within Groups	56.18333	20	2.809167			
Total	158.5133	23				

Because the labels were highlighted in the Input Range, the labels appear under "Groups" in the ANOVA summary. If you do not select labels, they will simply be called 1, 2, 3, 4, etc. The most important numbers to take away from these results are the **F** statistic and the **P-value**. These values tell you whether there is a significant difference between any of the treatment groups, but not which group is different.



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Go forth and test your data! And email me if you have any lingering questions!