The following is a quick overview of how to use Excel to do a one-way analysis of variance (ANOVA). As always, make sure you save your work frequently.

The tutorial will cover the following topics:

1. How to run a one-way ANOVA
2. How to graph the results of your one-way ANOVA.

You are already familiar with entering data from the last Excel homework. Use the mouse to click on each cell and type the information that is represented in the table below.

An investigator conducts an experiment involving the effects of three levels of drug on memory. Thirty subjects are randomly assigned to one of three conditions. A different drug level is administered in each condition. Memory is measured 10 minutes after each subject receives the drug. The following scores are recorded. The higher the score, the better the memory.

0 ml	100 ml	300 ml
10	13	15
12	15	19
14	17	20
18	22	25
17	16	19
15	18	26
17	19	30
19	22	31
23	27	36
20	21	29

1. To do a one-way ANOVA, click on the "Data Analysis" option from the Tools menu and select "ANOVA: Single Factor." Fill in the input range (selecting **all** of your data cells), alpha level, and output range (any blank cell) to complete the one-way ANOVA. *Also make sure the check the box next to "Labels in First Row" if you included the labels in your input range.*

2. You should make a line graph (with markers displayed at each data value) that has one line representing the mean scores of the memory test in each of the three conditions. The best place to get the mean scores on the memory test is from the "Average" row on the Summary Table that appears before the ANOVA table. Copy and paste these scores as well as the "Groups" labels from the Summary Table so that they are next to each other. If you click on the "Chart" from the Insert Menu, Excel will call up the chart wizard and take you through creating a line graph for your data.

After you create your graph, look to see if it corresponds to the results in the ANOVA table. The graph and ANOVA table should be telling the same story.

Descriptive Statistics

0 ml		*100 ml*		*300 ml*	
Mean	16.5	Mean	19	Mean	25
Standard Error	1.222475	Standard Error	1.299573	Standard Error	2.097618
Median	17	Median	18.5	Median	25.5
Mode	17	Mode	22	Mode	19
Standard Deviation	3.865805	Standard Deviation	4.109609	Standard Deviation	6.63325
Sample Variance	14.94444	Sample Variance	16.88889	Sample Variance	44
Kurtosis	-0.21666	Kurtosis	0.193603	Kurtosis	-0.95319
Skewness	-0.1154	Skewness	0.51628	Skewness	0.085657
Range	13	Range	14	Range	21
Minimum	10	Minimum	13	Minimum	15
Maximum	23	Maximum	27	Maximum	36
Sum	165	Sum	190	Sum	250
Count	10	Count	10	Count	10

largest variance/smallest variance 2.944238 <= 4 so HOV has been met.

Kurtosis and Skewness all fall between +/- 1 so the normality assumption as been met

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
0 ml	10	165	16.5	14.94444444
100 ml	10	190	19	16.88888889
300 ml	10	250	25	44

ANOVA

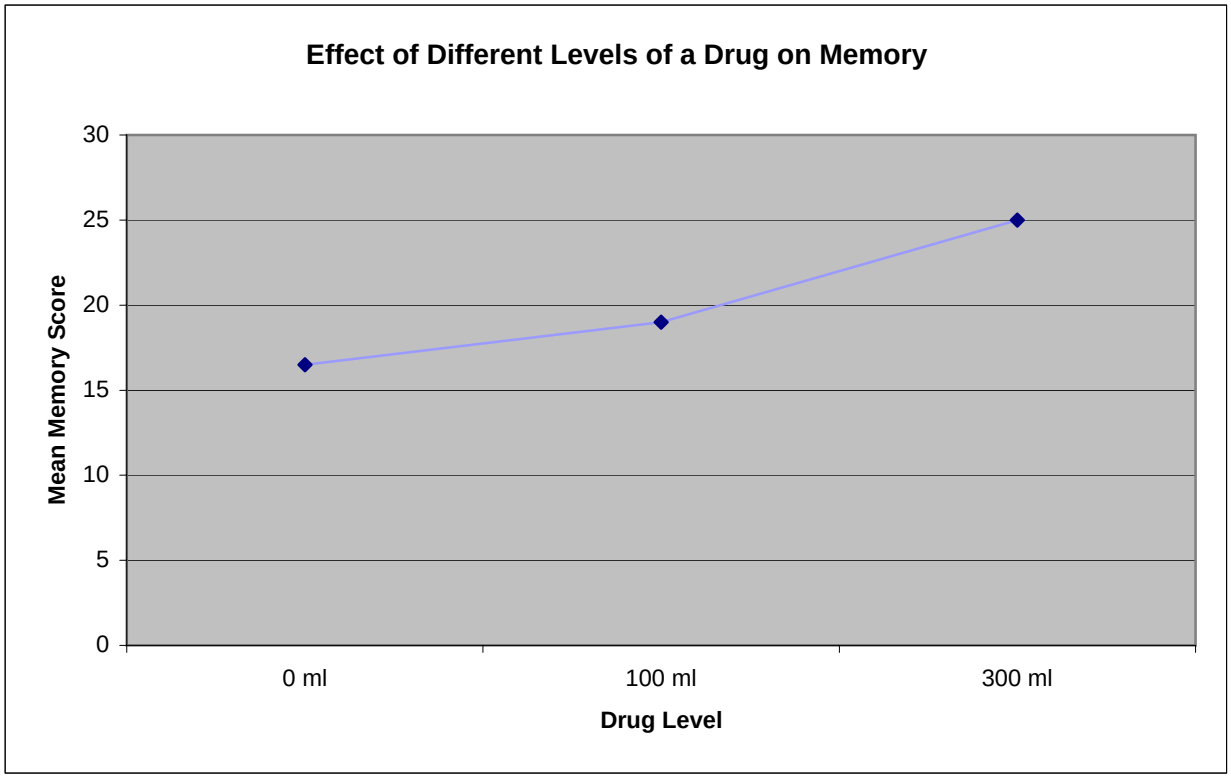
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	381.6667	2	190.8333	7.549450549	0.002487	3.354131
Within Groups	682.5	27	25.27778			
Total	1064.167	29				

Since p <= 0.05 we can reject the null hypothesis and say that there is an effect of level of drug.

Cut from Summary Table:

Groups	*Average*
0 ml	16.5
100 ml	19
300 ml	25

Highlight only these six cells when creating your line graph.
The "Series in:" should be marked for columns so you get one line.



The results of the graph correspond with the results on the ANOVA in that there appears to be an effect of level of drug on memory scores.