

One-Way ANOVA F-tests

To calculate a One-way ANOVA F-test in Excel

- Choose the variables that you want to use as the independent, variable and the independent variable, group variable that you want to calculate an independent t-test for. I will use Q1 and Ethnicity.
- As you did for the Independent t-test, move the independent variable, Ethnicity, to another column. Move the dependent variable, Q1, next to it, and sort the data. Move data for separate groups into new columns and label those groups so your data looks as it does below.

The screenshot shows an Excel spreadsheet with the following data:

Q6	Q7	Ethnicity	Specify	MarStat	FathEd	MothEd	FirstGen	EligFinAid	Ethnicity	Q1
4	2	5		2	1	1	1	1	1	4
3	1	7 Mono		1	3	2	1	1	3	2
5	5	8		1	5	4	2	2	3	5
3	3	3		1	3	2	1	1	3	2
4	5	8		2	4	5	2	1	3	4
2	4	8		1	4	4	2	1	3	3
4	5	1		1	5	5	2	2	3	2
4	2	6		1		3	1	1	5	3
2	4	10 East India		1	6	4	2	2	5	1
5	5	3		1	3	3	1	1	6	3
4	2	3		2	2	1	1	1	6	3
3	3	6		1	4	3	1	1	7	2
2	1	5		1	1	3	1	1	7	4
5	3	3		2	4	5	2	1	8	2
4	4	7 Chumash		1	2	3	1	1	8	4
3	3	3		1	4	5	2	1	8	3
3	4	3		1	2	3	1	1	8	2
3	1	8				3	1	1	8	4
		10 Decline to state					1	1	10	4
4	3	8		2	3	2	1	1	10	

The pivot table (columns S-Y) shows the distribution of Q1 values for each Ethnicity group:

Ethnicity	Q1
Asian	4
Hisp/Latin	2
SEAsian	3
AfrAmer	3
NativeAm	2
White	4
Other	4

- Click on Data Analysis and drag the cursor down to “ANOVA: Single Factor” and click on OK.

ERA 244 Module 4 Data Set w stats.xlsx - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

From Access From Web From Text From Other Sources Get External Data Existing Connections Refresh All Properties Edit Links Connections Sort & Filter Filter Clear Reapply Advanced Text to Columns Remove Duplicates Data Validation Consolidate What-If Analysis Group Ungroup Subtotal Show Detail Hide Detail Data Analysis Outline Analysis

	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	Q6	Q7	Ethnicity	Specify	MarStat	FathEd	MothEd	FirstGen	EligFinAid		Ethnicity	Q1	Asian	Hisp/Latin	SEAsian	AfrAmer	NativeAm	White	Other
2	4	2	5		2	1	1	1	1		1	4	4	2	3	3	2	2	2
3	3	1	7	Mono		1	3	2	1	1	3	2		5	1	3	4	4	4
4	5	5	8		1	5	4	2	2		3	5		2					3
5	3	3	3		1	3	2	1	1		3	2		4					2
6	4	5	8		2	4	5	2	1		3	4		3					4
7	2	4	8		1	4	4	2	1		3	3		2					
8	4	5	1		1	5	5	2	2		3	2							
9	4	2	6		1		3	1	1		5	3							
10	2	4	10	East India		1	6	4	2	2	5	1							
11	5	5	3		1	3	3	1	1		6	3							
12	4	2	3		2	2	1	1	1		6	3							
13	3	3	6		1	4	3	1	1		7	2							
14	2	1	5		1	1	3	1	1										
15	5	3	3		2	4	5	2	1										
16	4	4	7	Chumash		1	2	3	1	1									
17	3	3	3		1	4	5	2	1										
18	3	4	3		1	2	3	1	1										
19	3	1	8				3	1	1										
20			10	Decline to state				1	1										
21	4	3	8		2	3	2	1	1										
22																			
23																			
24																			
25																			
26																			
27																			
28																			
29																			
30																			
31																			
32																			
33																			
34																			
35																			
36																			
37																			
38																			

Data Analysis

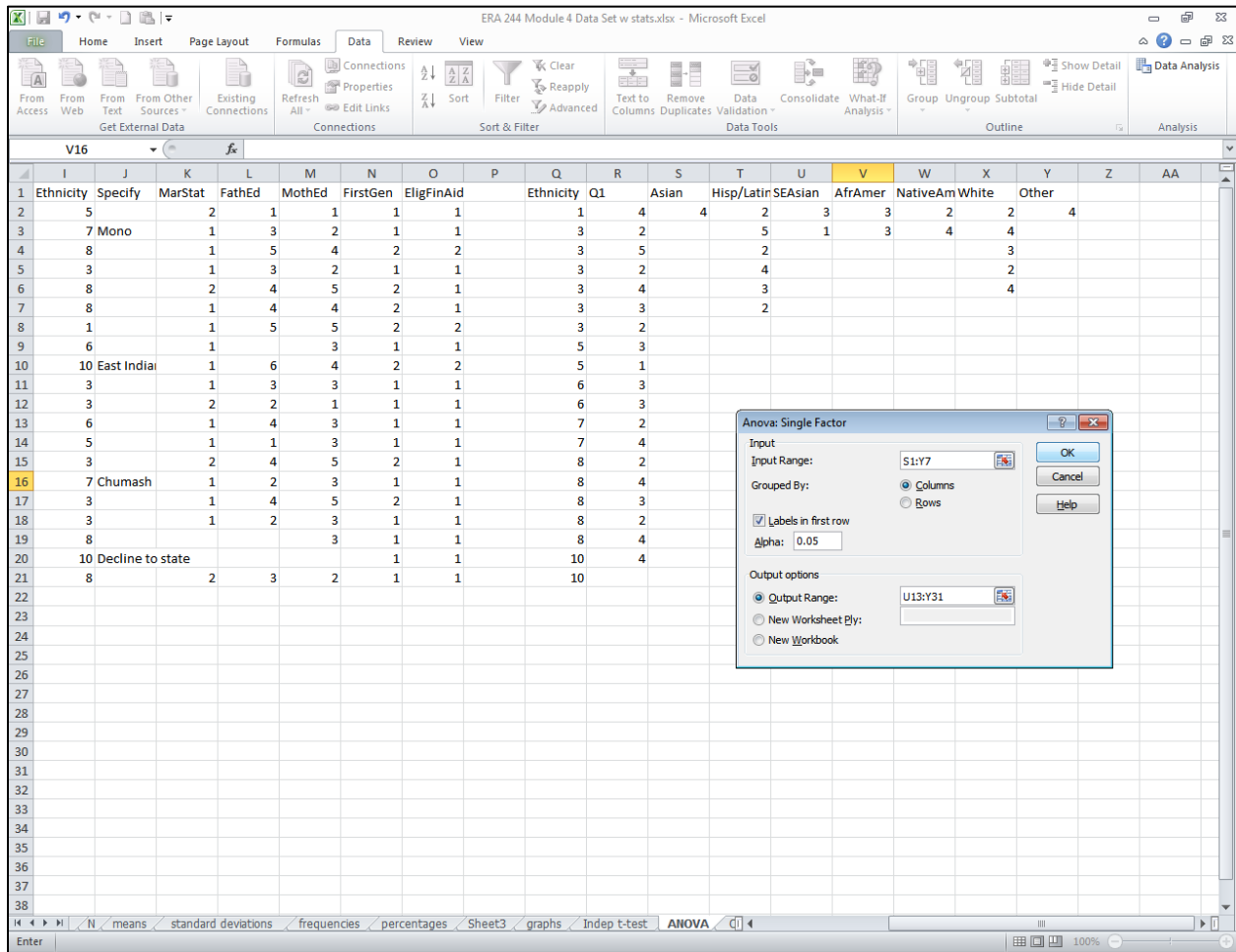
Analysis Tools

- Anova: Single Factor
- Anova: Two-Factor With Replication
- Anova: Two-Factor Without Replication
- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram

OK Cancel Help

Ready | N / means / standard deviations / frequencies / percentages / Sheet3 / graphs / Indep t-test / ANOVA / Q1 | Average: 3 | Count: 26 | Sum: 57 | 100%

- The following box will appear.



- Type in the cells that enclose the label and data S1:Y7.
- Click in the box by labels (If you don't type in the cell for the label, you don't have to check this box).
- Click on Output range and give an empty cell for the results to be printed in. Here it is U13 to Y31.
- Click on OK.

Your data will appear below. Notice that the means are labeled according to the column labels.

ERA 244 Module 4 Data Set w stats.xlsx - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

From Access From Web From Text From Other Sources Existing Connections Refresh All Connections Sort Filter Clear Reapply Advanced Text to Columns Remove Duplicates Data Validation Consolidate What-If Analysis Group Ungroup Subtotal Show Detail Hide Detail Data Analysis

U13 Anova: Single Factor

	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	Ethnicity	Specify	MarStat	FathEd	MothEd	FirstGen	EligFinAid		Ethnicity	Q1	Asian	Hisp/Latin	SEAsian	AfrAmer	NativeAm	White	Other		
2	5		2	1	1	1	1		1	4	4	2	3	3	2	2	4		
3	7 Mono		1	3	2	1	1		3	2		5	1	3	4	4			
4	8		1	5	4	2	2		3	5		2				3			
5	3		1	3	2	1	1		3	2		4				2			
6	8		2	4	5	2	1		3	4		3				4			
7	8		1	4	4	2	1		3	3		2							
8	1		1	5	5	2	2		3	2									
9	6		1		3	1	1		5	3									
10	10 East India		1	6	4	2	2		5	1									
11	3		1	3	3	1	1		6	3									
12	3		2	2	1	1	1		6	3									
13	6		1	4	3	1	1		7	2									
14	5		1	1	3	1	1		7	4									
15	3		2	4	5	2	1		8	2									
16	7 Chumash		1	2	3	1	1		8	4									
17	3		1	4	5	2	1		8	3									
18	3		1	2	3	1	1		8	2									
19	8				3	1	1		8	4									
20	10 Decline to state					1	1		10	4									
21	8		2	3	2	1	1		10										
22																			
23																			
24																			
25																			
26																			
27																			
28																			
29																			
30																			
31																			
32																			
33																			
34																			
35																			
36																			
37																			
38																			

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Asian	1	4	4	#DIV/0!
Hisp/Latin	6	18	3	1.6
SEAsian	2	4	2	2
AfrAmer	2	6	3	0
NativeAm	2	6	3	2
White	5	15	3	1
Other	1	4	4	#DIV/0!

ANOVA

Source of Variance	SS	df	MS	F	P-value	F crit
Between Groups	4	6	0.666667	0.5	0.796918	2.99612
Within Groups	16	12	1.333333			
Total	20	18				

means standard deviations frequencies percentages Sheet3 graphs Indep t-test ANOVA

I have copied the results into this Word file

Anova: Single Factor

SUMMARY

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Asian	1	4	4	#DIV/0!
Hisp/Latino	6	18	3	1.6
SEAsian	2	4	2	2
AfrAmer	2	6	3	0
NativeAmer	2	6	3	2
White	5	15	3	1
Other	1	4	4	#DIV/0!

ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	4	6	0.666667	0.5	0.796918	2.99612
Within Groups	16	12	1.333333			
Total	20	18				

The means for ethnicity groups are in red. The variances are in blue. You can get standard deviations by squaring this variance number for each group. #DIV/0! For Asians and Others means that the variance and also the standard deviation could not be calculated because there was only person in that group. The formula for variance has N-1 in the denominator and 1-1=0 so those variances could not be calculated. The F value and P value are in green. Remember you want the p value to be less than .05 for the F to be significant meaning that these groups are significantly different on Q1. The degrees of freedom are in purple.

Your write-up should read:

The means and standard deviations appear in Table 1 (you can do that table yourselves.) The F-test of differences in means on Q1 between ethnic groups was not significantly different ($F(6,12) = .5, p = .80$).

If this p was less than .05, you would need to say that there was a significant difference, and the group with the highest mean was different from the group with the lowest mean.