Name:_____ STA 3123L
Panther ID:_____ Date:_____

Lab Assignment 2

Directions: Below there are two example problems solved and explained. After the examples there are exercises that need to be completed using SPSS. For each problem make sure that you print out and label your SPSS output. You may cut and paste the output into a word document if you prefer, but make sure that every question answered includes the relevant SPSS output.

Before we begin the examples, we should open SPSS.
Open SPSS by going to:
Start → *all programs* → *SPSS for Windows* → *SPSS 15.0 for Windows*. After opening SPSS you will see a pop up box which will ask you, "What would you like to do?" Click Cancel.
At the bottom of the screen, you will see two tabs: Data View and Variable View.
Click the 'Variable View' Tab
Congratulations! You are now ready to begin using SPSS.

Example 1: Our first example will demonstrate how to create a confidence interval and conduct a hypothesis test to compare two population means when the samples are independent:

Below is a list of "fear of negative evaluation (FNE)" scores for 11 female students known to suffer from an eating disorder called bulimia and 14 female students with normal eating habits. The higher the score the greater the fear held by the subject. Find a 98% confidence interval for the difference between the population means for the two groups of females, and then, using a 2% significance level, test the claim that the bulimic group of females has a higher average FNE score. Finally, what assumptions did you need to make to conduct this test? Does your output support these assumptions?

Bulimic	21	13	10	20	25	19	16	21	24	13	14			
Normal	13	6	16	13	8	19	23	18	11	19	7	10	15	20

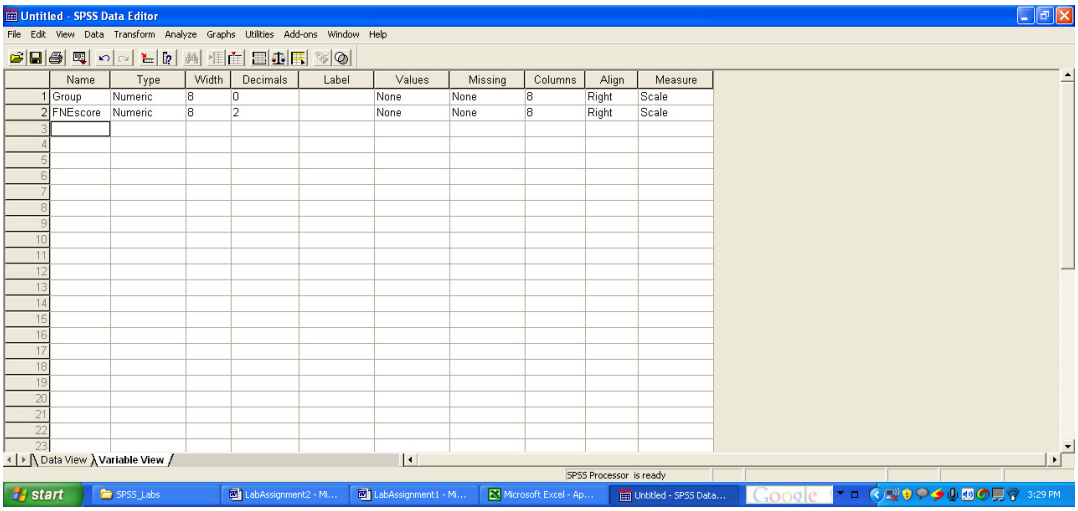
Step 1: Under the 'Variable View' tab in SPSS, using the first two boxes in the first two rows, we need to enter a name for two variables (not the names you might think). In the first row we will enter the name 'Group' and in the second row we will enter the name 'FNEscore.'

Step 2: After entering each name we can press the tab key. In this box next to each name select 'Numeric' (since our data is numerical in nature).

Step 3: By hitting tab again you have the option of selecting the width of your data values (If you have very long numbers you may need to increase the width). If you press tab again, you can specify the number of decimal places in your data values. For 'Group,' I have entered zero as the number of decimal places because this is just a grouping variable.

Name:_____ STA 3123L

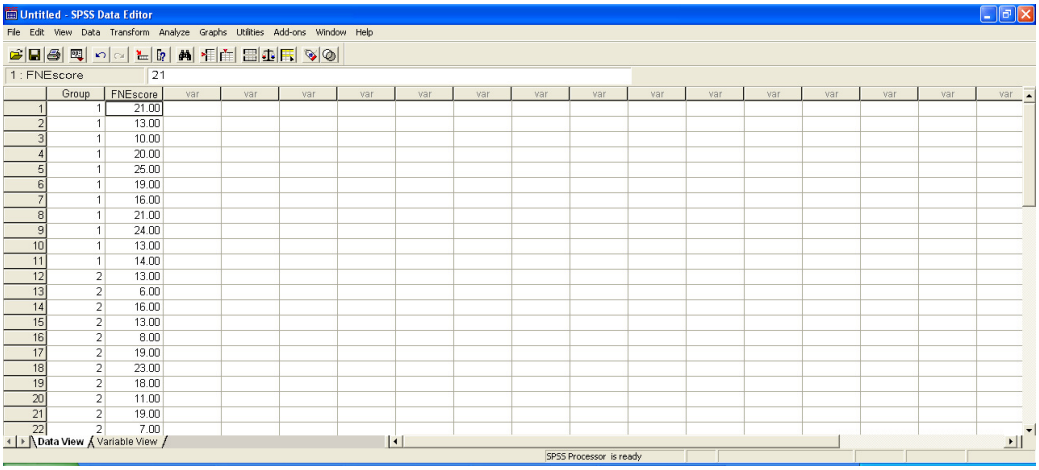
Panther ID:_____ Date:_____



Step 4: Click the 'Data View' tab. The first column should be labeled 'Group' and the second should be labeled 'FNEscore'

Step 5: In the 'Group' column we will enter 1 in the first eleven rows and 2 in the next fourteen rows. The number 1 will represent the bulimic group and 2 will represent the normal group.

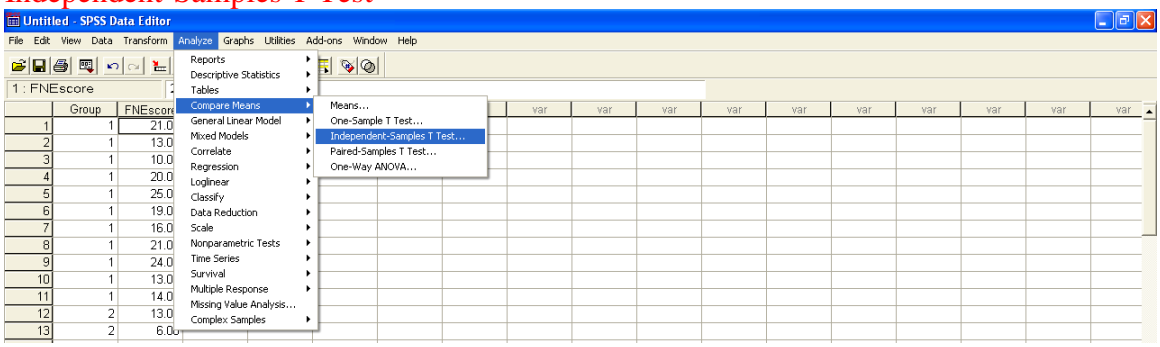
Step 6: Begin to enter your data in the column labeled 'FNEscore' by clicking the first box in the 'FNEscore' column and typing in the first value. After entering the first value press Enter on your keyboard. Repeat this approach for each value in the data set. Be sure to enter the bulimic scores next to the boxes in the 'Group' column that have a one next to them and the normal scores next to the boxes with a 2 in them.



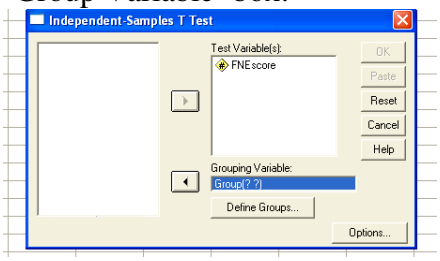
Name:_____ STA 3123L

Panther ID:_____ Date:_____

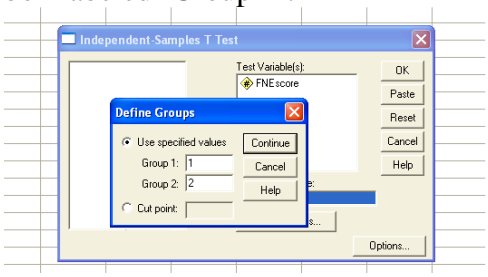
Step 7: At the top of the 'Data View' screen click Analyze → Compare Means → Independent-Samples T Test



Step 8: After clicking 'Independent-Sample T Test' from step 7 above, a box appears. Move your variable 'FNEscore' to the 'Test Variable(s)' box and move 'Group' to the 'Group Variable' box.



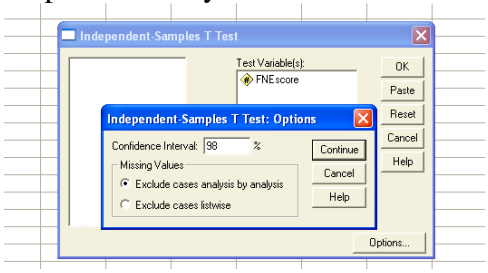
Step 9: Click Define Groups and enter 1 in the box labeled 'Group 1' and enter 2 in the box labeled 'Group 2'.



Step 10: Click Continue

Step 11: Click 'Options'

Step 12: Enter your desired confidence level, click continue →click ok



Name:_____ STA 3123L
Panther ID:_____ Date:_____

Step 13: View and interpret your output.

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
FNEscore	1	11	17.8182	4.91565	1.48212
	2	14	14.1429	5.28943	1.41366

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									98% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
FNEscore	Equal variances assumed	.055	.817	1.778	23	.089	3.67532	2.06704	-1.49200	8.84265
	Equal variances not assumed			1.794	22.284	.086	3.67532	2.04820	-1.45713	8.80778

Discussion: We can see the summary statistics in the first portion of our output. The standard deviations are not too far apart, so perhaps we can use the true t-test here. Regardless of the summary statistics, we have two results in our output: one assumes equal variance and the other does not. The p-value for either case will not allow us to reject the null hypothesis at the 2% significance level. Our confidence intervals show the same result, we cannot rule out the chance that the two groups have the same FNE scores.

Example 2: Our second example will illustrate how to create a confidence interval and conduct a hypothesis test to compare two population means when the samples are dependent:

It is believed that children need to sleep at least 8 hours to be able to concentrate in school. A researcher randomly selected 12 children to participate in a study to test the effect of rest on mental concentration. Each child is given a grade level appropriate passage to read after getting 8 hours of sleep the night before, and then the next night they are allowed just 6 hours of sleep and given another similar passage to read. The time it takes each child to complete the reading passages is recorded. The data is given below. Construct a 99% confidence interval for the true mean difference between passage reading times after 8 hours rest and after 6 hours rest. Then at the 1% significance level, test the claim that it takes longer on average to read the passage after just 6 hours sleep than it takes after 8 hours sleep.

Student	1	2	3	4	5	6	7	8	9	10	11	12
8 hrs rest	324	300	245	299	315	310	360	258	336	370	297	276
6 hrs rest	350	314	270	306	320	311	375	310	400	402	300	288

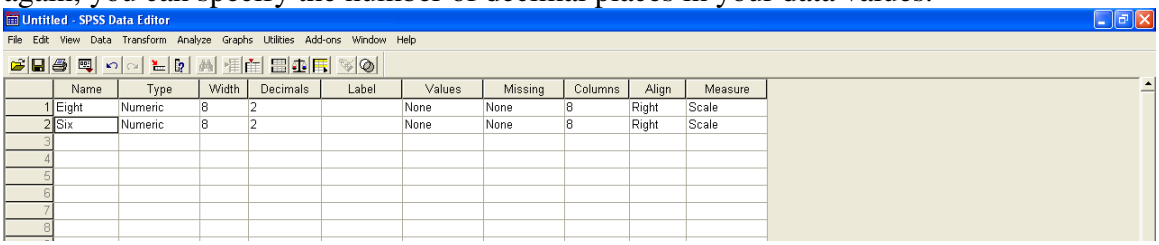
Name:_____ STA 3123L

Panther ID:_____ Date:_____

Step 1: Under the 'Variable View' tab in SPSS, using the first two boxes in the first two rows, we need to enter a name for our two variables. In the first row we will enter the name 'Eight' and in the second row we will enter the name 'Six.'

Step 2: After entering each name we can press the tab key. In this box next to each name select 'Numeric' (since our data is numerical in nature).

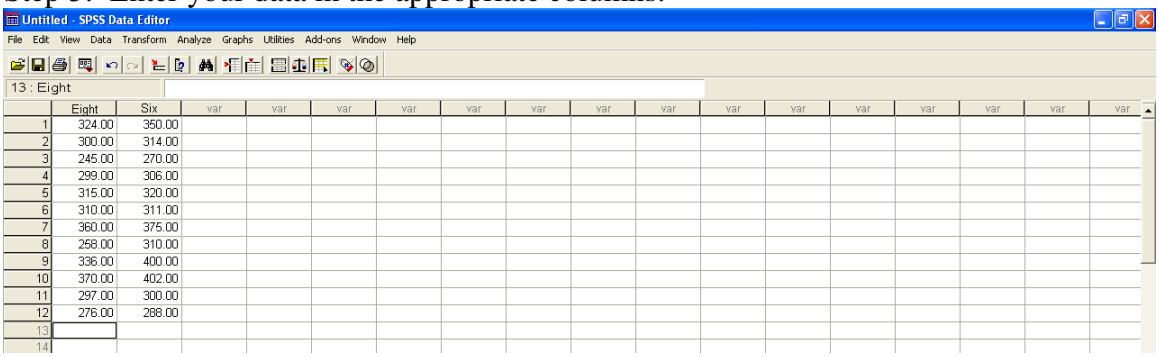
Step 3: By hitting tab again you have the option of selecting the width of your data values (If you have very long numbers you may need to increase the width). If you press tab again, you can specify the number of decimal places in your data values.



	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	Eight	Numeric	8	2		None	None	8	Right	Scale
2	Six	Numeric	8	2		None	None	8	Right	Scale
3										
4										
5										
6										
7										
8										

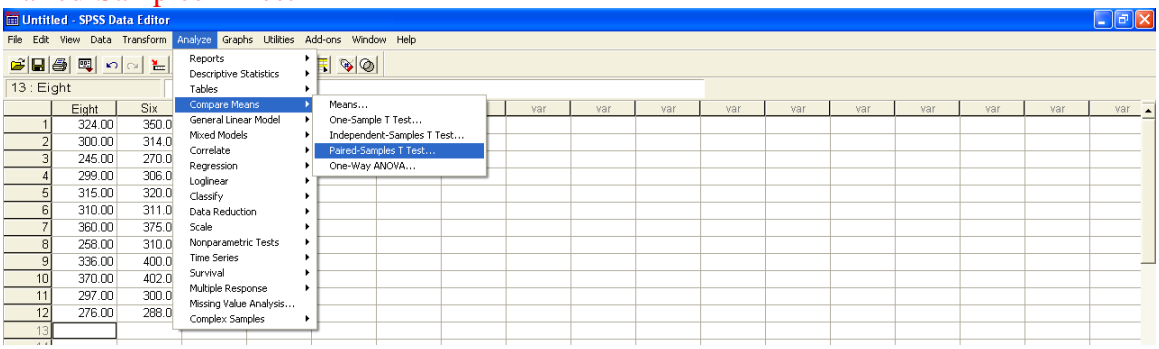
Step 4: Click the 'Data View' tab. The first column should be labeled 'Eight' and the second should be labeled 'Six'

Step 5: Enter your data in the appropriate columns.



	Eight	Six
1	324.00	350.00
2	300.00	314.00
3	245.00	270.00
4	299.00	306.00
5	315.00	320.00
6	310.00	311.00
7	360.00	375.00
8	258.00	310.00
9	336.00	400.00
10	370.00	402.00
11	297.00	300.00
12	276.00	288.00
13		
14		

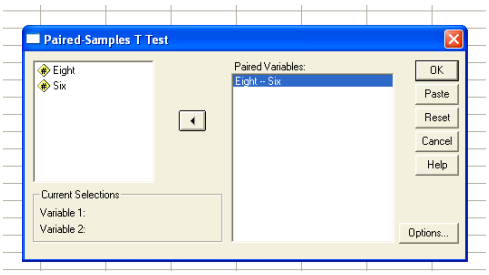
Step 6: At the top of the 'Data View' screen click Analyze → Compare Means → Paired-Samples T Test



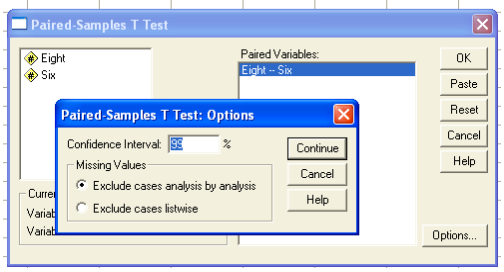
Step 7: After clicking 'Paired-Sample T Test' from step 6 above, a box appears. Move your variables 'Eight' and 'Six' to the 'Paired Variables' box.

Name:_____ STA 3123L

Panther ID:_____ Date:_____



Step 8: Click Options and enter your desired confidence level.



Step 9: Click Continue

Step 10: Click 'OK'

Step 12: View and interpret your output.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Eight	307.5000	12	37.41293	10.80018
	Six	328.8333	12	43.11683	12.44676

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Eight & Six	12	.889	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper			
Pair 1	Eight - Six	-21.33333	19.80052	5.71592	-39.08587	-3.58080	-3.732	11	.003

Discussion: The first output box gives the summary statistics for the data. The second box actually gives us a measure of the linear relationship between the two samples. If the number is positive and close to one, it indicates the two samples are positively related (which we would expect in this case-we will study correlation later in the course).

Finally, the last output box shows that the sample data can support the claim that the difference (Eight – Six) is less than zero. This implies that when students get only six hours of sleep instead of the standard eight hours of sleep it takes them longer to read a grade level reading passage. Our p-value is very small ($p < \alpha$), and our confidence interval has two negative limits.

Exercises:

1. Work problem 9.27 on page 452 (page 12 of E2 practice problems) using SPSS, but use a significance level of 5% and form a 95% confidence interval for the true mean difference between the two groups. After printing your results, compare the results of the confidence interval to the results of your hypothesis test.
2. Work the following problem using SPSS, and form a 95% confidence interval for the true mean difference. Which method has the smaller mean compression ratio? Print your results.

   A compression-depression method of testing circuits based on Huffman coding is being studied by researchers. Experimental results were obtained by testing 11 circuits. Each circuit was tested using the standard method and the Huffman method. The compression ratio was recorded. The data is given below:

Circuit	Standard method	Huffman method
1	.8	.78
2	.8	.80
3	.83	.86
4	.53	.53
5	.5	.51
6	.96	.68
7	.99	.82
8	.98	.72
9	.81	.45
10	.95	.79
11	.99	.77