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

Lab Assignment 3

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: Use SPSS to analyze the following data from a CRD experiment, and use a multiple comparison procedure to compare the different treatment means:

Bread dough was stored at three different temperatures to determine which temperature produced the largest volume. The identical mounds of bread dough were allowed to sit and rise for four hours each. The data is given below:

Temperatures:	**65**	**70**	**75**
Volumes	3300	3540	3775
	3320	3560	3765
	3290	3575	3780
	3285	3565	3795
	3305	3550	3785
Totals			

Step 1: Under the 'Variable View' tab in SPSS, we need to enter a name for two variables. In the first row we will enter the name 'Temps' and in the second row we will enter the name 'Volumes.'

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 'Temps,' I have entered zero as the number of decimal places because this is just a grouping variable.

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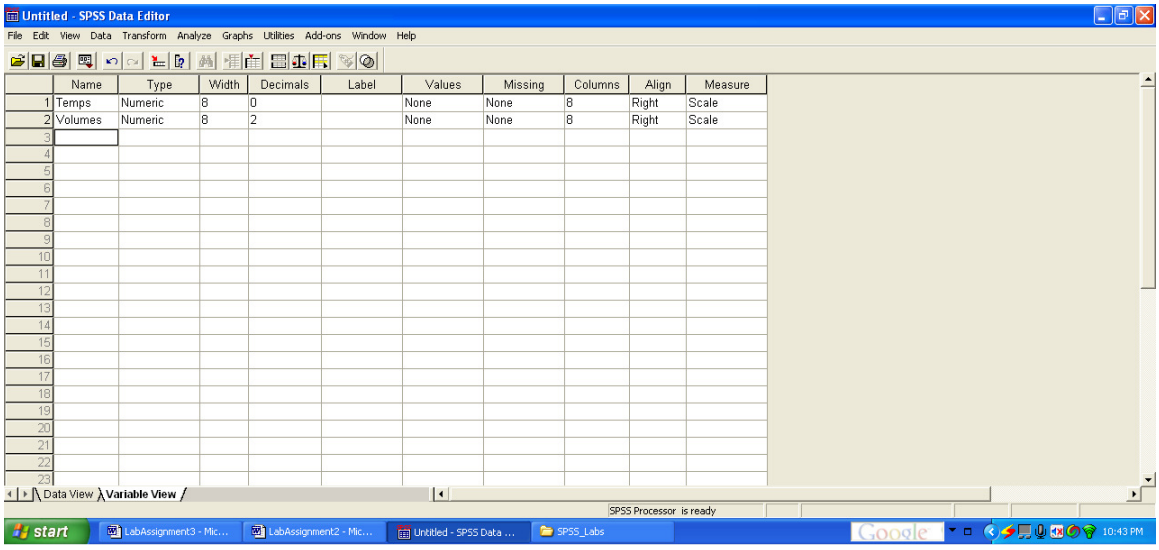
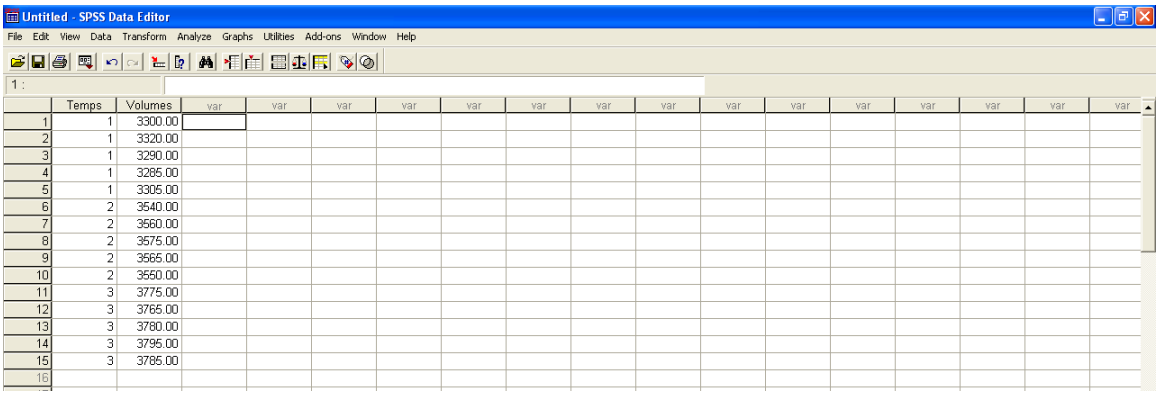
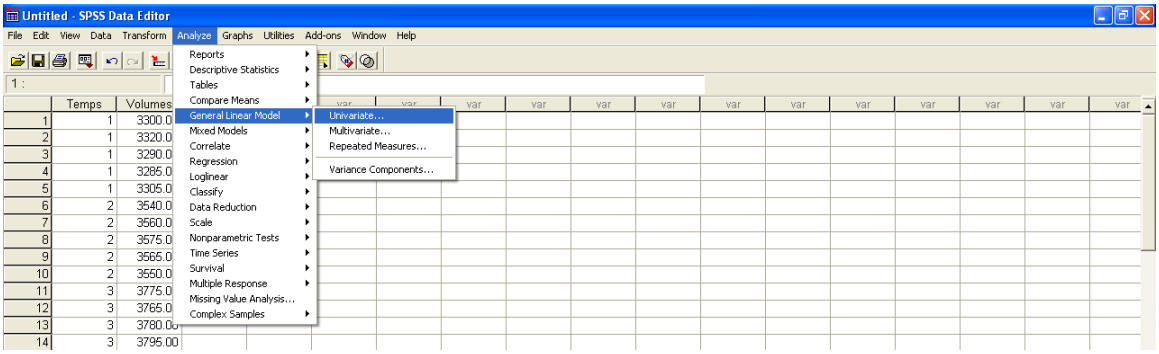


Step 4: Click the 'Data View' tab. The first column should be labeled 'Temps' and the second should be labeled 'Volumes'

Step 5: In the 'Temps' column we will enter 1 in the first five rows, 2 in the next five rows, and 3 in the next five rows. The number 1 will represent the 65 degree temp, the number 2 will represent the 70 degree temp, and 3 will represent the 75 degree temp. Then list the volumes next to the corresponding temperature values.



Step 6: At the top of the 'Data View' screen click Analyze → General Linear Model → Univariate



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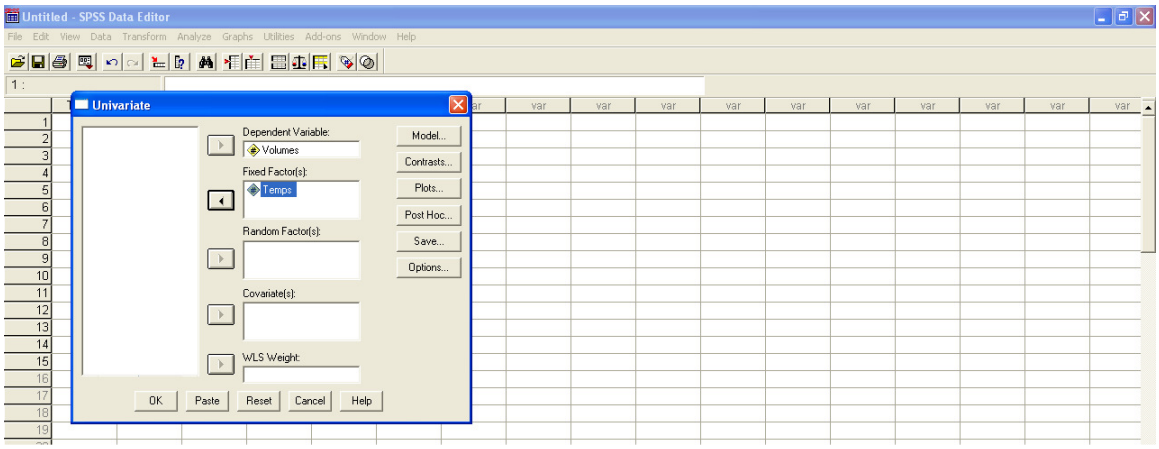
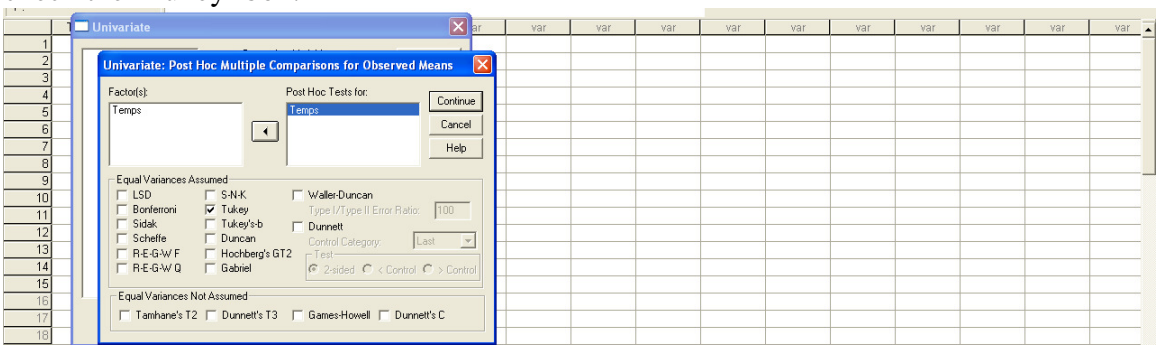
Step 7: After clicking 'Univariate' from step 6 above, a box appears. Move your variable 'Temps' to the 'Fixed Factors' box and move 'Volumes' to the 'Dependent Variable' box.



Step 8: Then click 'Post Hoc' and move 'Temps' to the 'Post Hoc Test for:' box. Then check the 'Tukey' box.



Step 9: Click Continue

Step 10: Click Ok

Tests of Between-Subjects Effects

Dependent Variable: Volumes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	577080.000[a]	2	288540.000	1748.727	.000
Intercept	188611740	1	188611740.0	1143101	.000
Temps	577080.000	2	288540.000	1748.727	.000
Error	1980.000	12	165.000		
Total	189190800	15			
Corrected Total	579060.000	14			

a. R Squared = .997 (Adjusted R Squared = .996)

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Multiple Comparisons

Dependent Variable: Volumes
Tukey HSD

(I) Temps	(J) Temps	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-258.0000*	8.12404	.000	-279.6738	-236.3262
	3	-480.0000*	8.12404	.000	-501.6738	-458.3262
2	1	258.0000*	8.12404	.000	236.3262	279.6738
	3	-222.0000*	8.12404	.000	-243.6738	-200.3262
3	1	480.0000*	8.12404	.000	458.3262	501.6738
	2	222.0000*	8.12404	.000	200.3262	243.6738

Based on observed means.

*. The mean difference is significant at the .05 level.

Volumes

Tukey HSD[a,b]

Temps	N	Subset		
		1	2	3
1	5	3300.0000		
2	5		3558.0000	
3	5			3780.0000
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on Type III Sum of Squares
The error term is Mean Square(Error) = 165.000.

a. Uses Harmonic Mean Sample Size = 5.000.

b. Alpha = .05.

Example 2: Use SPSS to analyze the following data from a RBD experiment, and use a multiple comparison procedure to compare the different treatment means:

Four methods of manufacturing penicillin were compared. The blocks are blends of the raw material (corn steep liquor) which are known to be quite variable.

Blend	Method			
	A	B	C	D
1	89	88	97	94
2	84	77	92	79
3	81	87	87	85
4	87	92	89	84
5	79	81	80	88

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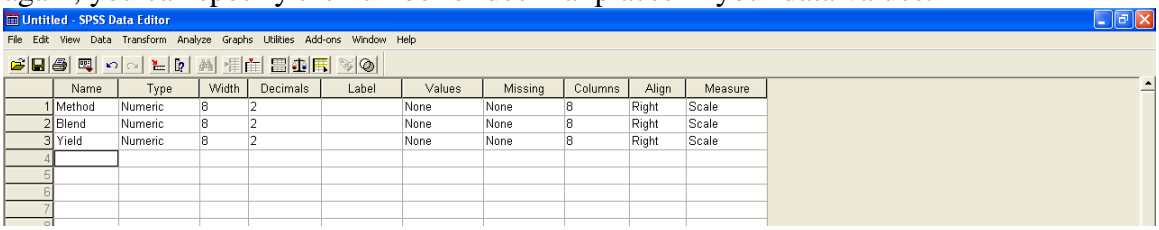
Step 1: Under the 'Variable View' tab in SPSS, we need to enter a name for three variables. In the first row we will enter the name 'Method,' in the second row we will enter the name 'Blend,' and in the third row we will enter the name 'Yield.'

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).

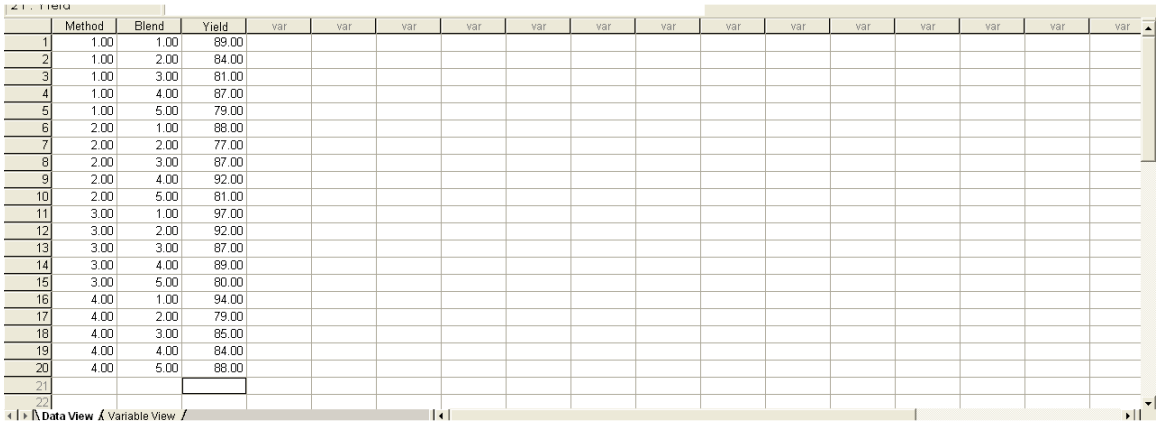
Step 3: By hitting tab again you have the option of selecting the width of your data values (If you have very long numbers you may need to increase the width). If you press tab again, you can specify the number of decimal places in your data values.



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

Step 4: Click the 'Data View' tab.

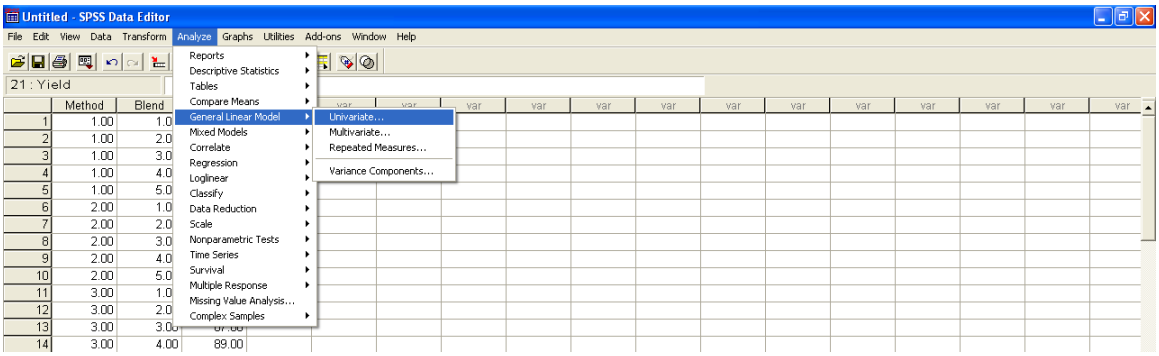
Step 5: In the 'Method' column we will enter 1 in the first five rows, 2 in the next five rows, and 3 in the next five rows . . . In the 'Blend' column repeat the pattern 1, 2, 3, 4, and 5 until you have four sets of the pattern. Then cut and paste the table columns into the 'Yield' column in SPSS.



	Method	Blend	Yield
1	1.00	1.00	89.00
2	1.00	2.00	84.00
3	1.00	3.00	81.00
4	1.00	4.00	87.00
5	1.00	5.00	79.00
6	2.00	1.00	88.00
7	2.00	2.00	77.00
8	2.00	3.00	87.00
9	2.00	4.00	92.00
10	2.00	5.00	81.00
11	3.00	1.00	97.00
12	3.00	2.00	92.00
13	3.00	3.00	87.00
14	3.00	4.00	89.00
15	3.00	5.00	80.00
16	4.00	1.00	94.00
17	4.00	2.00	79.00
18	4.00	3.00	85.00
19	4.00	4.00	84.00
20	4.00	5.00	88.00
21			
22			

Data View / Variable View

Step 6: At the top of the 'Data View' screen click Analyze → General Linear Model → Univariate



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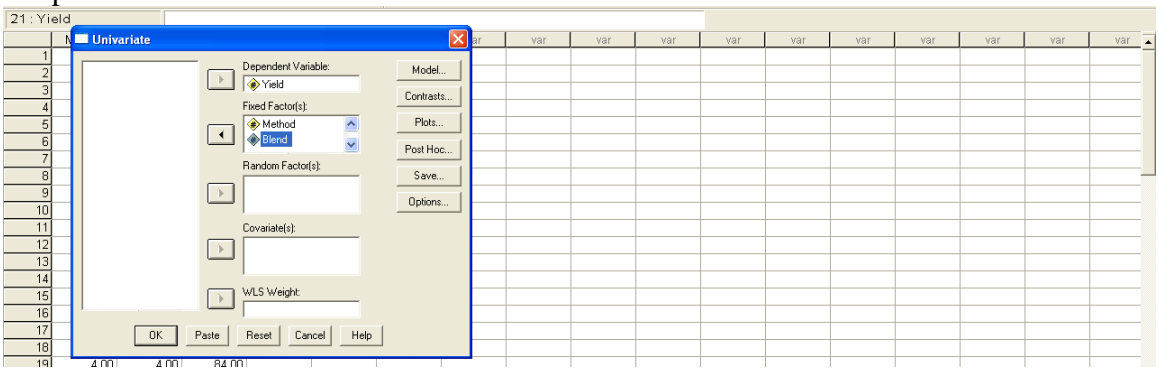
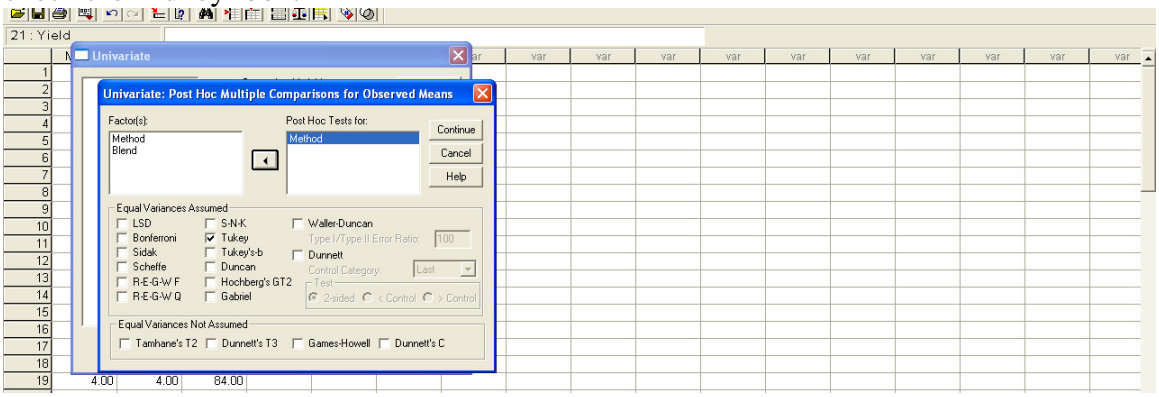
Step 7: After clicking 'Univariate' from step 6 above, a box appears. Move your variables 'Method' and 'Blend' to the 'Fixed Factor(s)' box and move 'Yield' to the 'Dependent Variable' box.

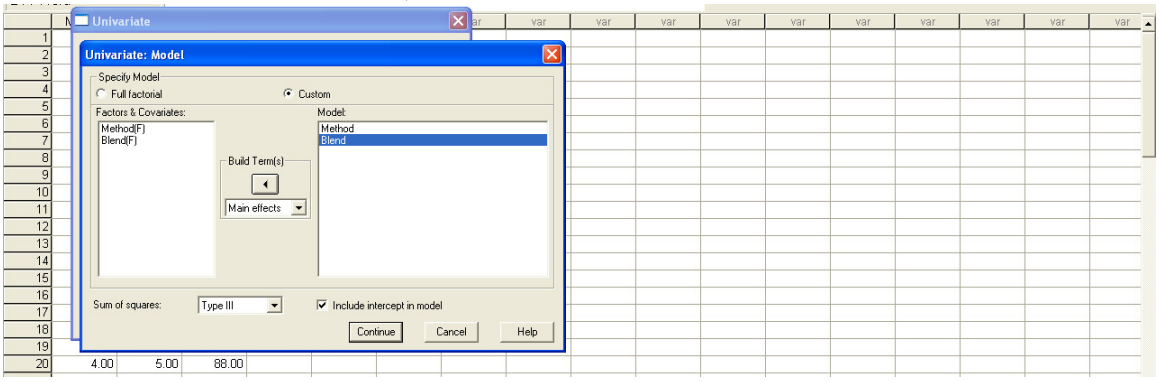


Step 8: Then click 'Post Hoc' and move 'Method' to the 'Post Hoc Test for:' box. Then check the 'Tukey' box.



Step 9: Click Continue

Step 10: Click Model → Custom, Then select 'Main Effects' from the drop down box under the 'Build Terms' button, and move 'Method' and 'Blend' to the 'Model' box.



Step 11: Click Continue

Step 12: Click Ok

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Tests of Between-Subjects Effects

Dependent Variable: Yield

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	334.000[a]	7	47.714	2.534	.075
Intercept	147920.000	1	147920.000	7854.159	.000
Method	70.000	3	23.333	1.239	.339
Blend	264.000	4	66.000	3.504	.041
Error	226.000	12	18.833		
Total	148480.000	20			
Corrected Total	560.000	19			

a. R Squared = .596 (Adjusted R Squared = .361)

Multiple Comparisons

Dependent Variable: Yield

Tukey HSD

(I) Method	(J) Method	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-1.0000	2.74469	.983	-9.1487	7.1487
	3.00	-5.0000	2.74469	.311	-13.1487	3.1487
	4.00	-2.0000	2.74469	.884	-10.1487	6.1487
2.00	1.00	1.0000	2.74469	.983	-7.1487	9.1487
	3.00	-4.0000	2.74469	.491	-12.1487	4.1487
	4.00	-1.0000	2.74469	.983	-9.1487	7.1487
3.00	1.00	5.0000	2.74469	.311	-3.1487	13.1487
	2.00	4.0000	2.74469	.491	-4.1487	12.1487
	4.00	3.0000	2.74469	.700	-5.1487	11.1487
4.00	1.00	2.0000	2.74469	.884	-6.1487	10.1487
	2.00	1.0000	2.74469	.983	-7.1487	9.1487
	3.00	-3.0000	2.74469	.700	-11.1487	5.1487

Based on observed means.

Yield

Tukey HSD [a,b]

Method	N	Subset 1
1.00	5	84.0000
2.00	5	85.0000
4.00	5	86.0000
3.00	5	89.0000
Sig.		.311

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = 18.833.

a. Uses Harmonic Mean Sample Size = 5.000.

b. Alpha = .05.

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Exercise 1: Work problem 10.25 on p. 533 using SPSS (p47 of the pdf practice problems exam 2).

Exercise 2: Work problem 10.59 on p. 555 parts a – d using SPSS (p57 of the pdf practice problems exam 2).