Name_____

Ψ 420
Ainsworth

Psy 420 – Midterm 1
Part 2 – In lab (50 points total)

Your 420 professor decides that he wants to find out how much impact amount of study time has on the first midterm. He randomly assigns students to study for 10 hours, 8 hours, 6 hours, 4 hours and 2 hours; recording each student's midterm grade. Results are shown below.

	10 hours	8 hours	6 hours	4 hours	2 hours
	83	57	24	20	21
	67	67	43	37	17
	88	69	30	36	31
	97	68	55	47	2
	74	73	32	36	25
	89	67	46	24	29
	93	72	43	34	28
	65	48	31	20	26
	66	60	19	30	21
	86	59	40	30	27
Mean	80.80	64.00	36.30	31.40	22.70
SD	11.87	7.82	10.98	8.45	8.42

SPSS output for 420 midterm study

```
UNIANOVA
  score  BY stdytime
  /CONTRAST (stdytime)=special (1 -1 0 0 0
                                0 1 -1 0 0
                                0 0 1 -1 0
                                0 0 0 1 -1)
  /METHOD = SSTYPE(3)
  /INTERCEPT = INCLUDE
  /PRINT = ETASQ HOMOGENEITY
  /CRITERIA = ALPHA(.05)
  /DESIGN = stdytime .
```

Between-Subjects Factors

		Value Label	N
STDYTIME	1	10 hours	7
	2	8 hours	7
	3	6 hours	7
	4	4 hours	7
	5	2 hours	7

Levene's Test of Equality of Error Variances [a]

Dependent Variable: SCORE

F	df1	df2	Sig.
1.202	4	30	.331

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+STDYTIME

Tests of Between-Subjects Effects

Dependent Variable: SCORE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	18752.686[a]	4	4688.171	53.763	.000	.878
Intercept	84919.314	1	84919.314	973.845	.000	.970
STDYTIME	18752.686	4	4688.171	53.763	.000	.878
Error	2616.000	30	87.200			
Total	106288.000	35				
Corrected Total	21368.686	34				

a. R Squared = .878 (Adjusted R Squared = .861)

Custom Hypothesis Tests

Contrast Results (K Matrix)

STDYTIME Special Contrast			Dependent Variable SCORE
Comp 1	Contrast Estimate		16.857
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		16.857
	Std. Error		4.991
	Sig.		.002
	95% Confidence Interval for Difference	Lower Bound	6.663
		Upper Bound	27.051
Comp 2	Contrast Estimate		28.571
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		28.571
	Std. Error		4.991
	Sig.		.000
	95% Confidence Interval for Difference	Lower Bound	18.378
		Upper Bound	38.765
Comp 3	Contrast Estimate		5.571
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		5.571
	Std. Error		4.991
	Sig.		.273
	95% Confidence Interval for Difference	Lower Bound	-4.622
		Upper Bound	15.765
Comp 4	Contrast Estimate		11.571
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		11.571
	Std. Error		4.991
	Sig.		.027
	95% Confidence Interval for Difference	Lower Bound	1.378
		Upper Bound	21.765

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Questions referring to the 420 Midterm Experiment

1. Do the five groups meet the homogeneity of variance assumption? How do you know? (2 points)
   Yes, Levene's test

2. Does amount of study time affect midterm scores? How do you know? (2 points)

   Yes, because of the overall ANOVA

3. Are the comparisons orthogonal? Show how you came to your conclusion. (2 points)

   No, because when you cross multiply them the sums are not zero (they're -1)

4. As a planned comparison, does studying for 4 hours improve your score when compared to only 2 hours? Explain your answer. (1 point)

   Yes, because Comp 4 is significant at .05.

5. Is 4 hours of study significantly different than 2 hours of study after a Tukey adjustment? Show your work. (3 points)

   They have calculated Tukey as a mean difference (because that's all they have from the table above) and come to the conclusion that it is no longer significant.

   $\bar{d}_T = q_T\sqrt{\frac{MS_{S/A}}{n}} = 4.10\sqrt{\frac{87.2}{10}} = 12.11$ I think that's right, I don't have the book and I looked up the value of q online. If they did it the other way and got the F-Tukey they should get most of the credit.

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A researcher is interested in whether different stats courses offered at CSUN aversely affect quality of life for students enrolled. The researcher randomly selected 5 students from each of the following courses: Psy 420, Psy 524 and Psy 520. Results and layout for a regression analysis are listed below, scores are on a scale of 1 to 10 with 10 meaning better quality of life.

	y	x1	x2
420	9	-1	-1
	8	-1	-1
	8	-1	-1
	8	-1	-1
	7	-1	-1
524	6	-1	1
	7	-1	1
	7	-1	1
	8	-1	1
	6	-1	1
520	3	2	0
	3	2	0
	3	2	0
	2	2	0
	3	2	0

Output for Stat Class Study

Variables Entered/Removed [b]

Model	Variables Entered	Variables Removed	Method
1	X2, X1 [a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Y

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.964[a]	.930	.918	.683

a. Predictors: (Constant), X2, X1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	74.133	2	37.067	79.429	.000[a]
	Residual	5.600	12	.467		
	Total	79.733	14			

a. Predictors: (Constant), X2, X1

b. Dependent Variable: Y

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Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.867	.176		33.261	.000
	X1	-1.533	.125	-.941	-12.294	.000
	X2	-.600	.216	-.212	-2.777	.017

a. Dependent Variable: Y

Questions related to the Stat Course Study

6. Does quality of life differ for the three statistics courses? Explain. (2 points)

Yes, regression above is significant.

7. What is the η^2 value for the effect of statistics classes? (2 points)

$$\eta^2 = \frac{74.133}{79.733} = .93$$

8. What is the predicted score for the first subject in the 420 course? Show how you got the answer. (2 points)

The answer is 8. And they could have got that answer by either solving for $Y' = -1*(-1.533) - 1*(-.60) + 5.867$ or they could have said that it was 8 because that is the mean for group 1.

9. Is quality of life statistically worse for students in the 524 course when compared to the 420 course? How do you know? (2 points)

Yes because the second b is significant and in the right direction.

10. How do you interpret the B for X_1 (-1.533)? The constant (5.867)? (2 points)

B is 1/3 the distance between the 2 groups (520 vs. 524 and 420)
Or it's the distance between 524 and 420 and the grand mean
Or it's half the distance between 520 and the grand mean.

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11. You are an experimenter trying to test the effect of different disorders (Aspergers, Pervasive Developmental Disorder, Autism) and different types of behavioral therapy (Floor time, Discrete Trials, Pivotal Response Training) on length of eye contact of each child (measured in seconds). 9 children with each disorder were randomly assigned to one of the three treatments (27 subjects total). Set up the chart below to do an ANOVA through regression for this data; just set it up, **do not proceed** to the analysis (20 points)

A	B	Y																
Aspergers	FT	2																
		1																
		2																
	DTT	3																
		4																
		3																
	PRT	2																
		2																
		1																
Pervasive DD	FT	3																
		4																
		4																
	DTT	2																
		4																
		3																
	PRT	1																
		2																
		2																
Autism	FT	1																
		0																
		1																
	DTT	3																
		3																
		3																
	PRT	1																
		1																
		1																
Sum		59																
Sum Sq		163																

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Output for the Disorders by Treatment study

Between-Subjects Factors

		Value Label	N
DISORDER	1.00	Aspergers	9
	2.00	Pervasive Developmental Disorder	9
	3.00	Autism	9
TREATMNT	1.00	Floortime	9
	2.00	Discrete Trial Training	9
	3.00	Pivotal Response Training	9

Descriptive Statistics

Dependent Variable: Y

DISORDER	TREATMNT	Mean	Std. Deviation	N
Aspergers	Floortime	1.6667	.57735	3
	Discrete Trial Training	3.3333	.57735	3
	Pivotal Response Training	1.6667	.57735	3
	Total	2.2222	.97183	9
Pervasive Developmental Disorder	Floortime	3.6667	.57735	3
	Discrete Trial Training	3.0000	1.00000	3
	Pivotal Response Training	1.6667	.57735	3
	Total	2.7778	1.09291	9
Autism	Floortime	.6667	.57735	3
	Discrete Trial Training	3.0000	.00000	3
	Pivotal Response Training	1.0000	.00000	3
	Total	1.5556	1.13039	9
Total	Floortime	2.0000	1.41421	9
	Discrete Trial Training	3.1111	.60093	9
	Pivotal Response Training	1.4444	.52705	9
	Total	2.1852	1.14479	27

Levene's Test of Equality of Error Variances [a]

Dependent Variable: Y

F	df1	df2	Sig.
2.400	8	18	.059

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+DISORDER+TREATMNT+DISORDER * TREATMNT

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Tests of Between-Subjects Effects

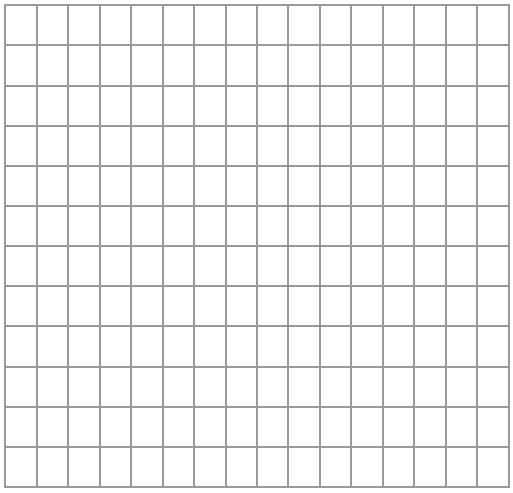
Dependent Variable: Y

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	28.074[a]	8	3.509	10.528	.000	.824
Intercept	128.926	1	128.926	386.778	.000	.956
DISORDER	6.741	2	3.370	10.111	.001	.529
TREATMNT	12.963	2	6.481	19.444	.000	.684
DISORDER * TREATMNT	8.370	4	2.093	6.278	.002	.582
Error	6.000	18	.333			
Total	163.000	27				
Corrected Total	34.074	26				

a. R Squared = .824 (Adjusted R Squared = .746)

Questions related to the Disorders by Treatment Study

12. There is a significant interaction, draw a graph (using the grid below) that illustrates the nature of the interaction above (5 points)



13. The effect size for treatment is .684, how did the computer calculate that number? (2 points)

12.963/12.963+6.00

14. Given the significant effects, what type of follow up comparisons should be performed (no computations, just tell me what it/they should be) (3 points)

Interaction contrasts