

Well, here it is...your opportunity to impress me with all that you've learned this semester. As before, the point value for a question is my estimate of how long it should take you to complete the problem. If you're having difficulty with a problem, don't waste time on it...move on to another problem and come back to it if you have time at the end. Answer each question as completely as you can — be thorough. Be sure to *show all your work!* Keep your eyes focused on your own exam. You have exactly 3 hours to complete the exam. No extra time will be allowed, so keep on track.

I hope that you do really well on this exam. I've enjoyed the interactive style of this class — thanks to all of you who remained so inquisitive and involved throughout the semester! Furthermore, I've been really impressed with the diligence that many of you exhibited in attending the weekly review sessions. I look forward to seeing many of you in future courses. Thanks for making my semester a pleasant one. Have a wonderful break. Come back relaxed and refreshed.

Peace,

1. Dr. C. D. Snow is interested in the relationship between loneliness and depression. She collects the data below. Analyze and interpret the data a completely as you can. On the basis of this evidence, would you argue that loneliness causes depression? Why or why not? (Be explicit.) [20 pts.]

<u>Participant</u>	<u>Loneliness Score</u>	<u>Depression Score</u>
1	4	16
2	27	37
3	18	33
4	7	23
5	30	34
6	12	32
7	18	24
8	23	29
9	19	26
10	12	26
Sum	170	280
SS	630	352

2a. In a study of memory processes, animals were presented with a one-trial avoidance task. As soon as they stepped across a line down the center of their cage they were shocked through a grid in the floor of the cage. Learning (avoidance) would be present if the animals took longer to cross over the line on subsequent trials.

One independent variable in this study is the site at which these animals had electrodes implanted in their brains (Neutral Site, Area A, or Area B). After crossing the line and receiving a shock to their feet, a small amount of electrical stimulation was sent to one of these three sites. Each group was further divided based on the second independent variable — the time delay between crossing the line and receiving electrical stimulation to their brain electrodes. A third of each group was given the stimulation 50, 100, or 150 milliseconds after crossing the line and receiving foot shock.

If the brain area stimulated is involved in memory, stimulation would be expected to interfere with consolidation and retard learning of the avoidance response. The dependent variable was the number of seconds it took the animal to cross the line on the second trial. Thus, longer times to cross the line correspond to greater learning and shorter times correspond to lesser learning.

Below are the means, a graph, and a partially completed StatView source table for this experiment. Complete the source table and analyze/interpret the results as completely as possible. [25 pts]

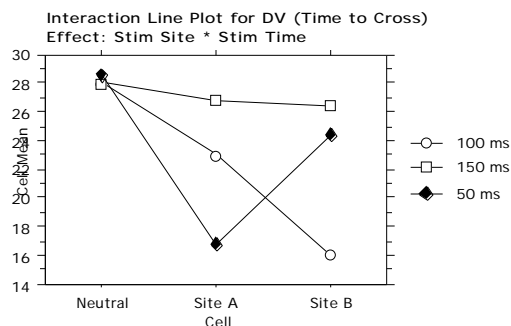
ANOVA Table for DV (Time to Cross)

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Stim Site				6.074	.0053	12.147	.868
Stim Time			94.289		.0518	6.434	.571
Stim Site * Stim Time			92.989		.0248	12.690	.770
Residual	36	1055.200					

Means Table for DV (Time to Cross)

Effect: Stim Site * Stim Time

	Count	Mean	Std. Dev.	Std. Err.
Neutral, 100 ms	5	28.000	4.690	2.098
Neutral, 150 ms	5	28.000	5.612	2.510
Neutral, 50 ms	5	28.600	7.403	3.311
Site A, 100 ms	5	23.000	4.743	2.121
Site A, 150 ms	5	26.800	5.404	2.417
Site A, 50 ms	5	16.800	5.718	2.557
Site B, 100 ms	5	16.000	5.612	2.510
Site B, 150 ms	5	26.400	4.159	1.860
Site B, 50 ms	5	24.400	4.722	2.112



2b. Suppose that you had analyzed the same data as a one-way ANOVA on Site. How would your source table look? [10 pts.]

SOURCE	SS	df	MS	F
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Total

3. Ordinarily, if you have the ability to compute a two-way ANOVA or a one-way ANOVA on the same data set, you will benefit from computing a two-way ANOVA. Why is that so? Be explicit! (An example with source tables would help your explanation.) [15 pts.]

OR

Ordinarily, a repeated measures ANOVA yields a higher F-ratio than an independent groups ANOVA on the same data. However, in a very specific set of circumstances, that will not be true. Explain those circumstances to me. (An example with source tables would help your explanation.) [15 pts.]

4. Below are some summary data from an experiment. On the basis of this information, you can compute an ANOVA. (Trust me, you can!) There's a slightly more time-consuming way to get the source table from these data. A somewhat shorter procedure requires that you use information that you should know about the basis for the MS_{Between} and the MS_{Within} . In fact, you should even be able to find a handout that shows you exactly how to complete the source table in this short fashion. I include this problem because it really gets to the heart of understanding the ANOVA. Analyze the data as completely as possible (i.e., don't simply complete the source table). [30 pts.]

IV = Type of learning strategy (Repetition, Imagery, Make-a-Story, No Instructions)
 DV = Number of words recalled out of 30

	<u>Repetition</u>	<u>Imagery</u>	<u>Make-a-Story</u>	<u>No Instructions</u>
Mean	2.6	7.2	7.2	5.7
Variance	1.6	2.4	2.4	.9
n	10	10	10	10

<u>SOURCE</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Between				
Within				
Total				

5. Suppose that you are interested in whether or not the nature of a video produces differences in yawning. You have 11 participants first watch an Interesting and then an Uninteresting video. As they watch the videos, you observe the number of times that the participants yawn. Below are the data. Analyze the data as completely as you can. This study has a major flaw that you should notice when you think about the nature of the design. Can you tell me the problem? (Hint: Think about a critical procedure that you must invoke in a design of this sort.) [20 pts.]

<u>Participant</u>	<u>Interesting Video</u>	<u>Uninteresting Video</u>
1	5	7
2	2	1
3	4	7
4	3	8
5	0	2
6	4	5
7	7	6
8	6	9
9	3	3
10	1	4
11	8	9
Sum	43	61
SS	60.9	76.7

6. Many tasks require people to be vigilant over a long period, such as an air traffic controller monitoring a radar screen to maintain the proper distance between planes. Thus, psychologists have studied various factors affecting vigilance. As an example, Pfendler and Widdel (1986) had people monitor a simulated display of the dials in the control room of a ship for a 2.5-hour period to see if people became increasingly likely to miss changes in the dials over the 2.5-hour period. Suppose that we were to extend the experiment to a 4-hour period. The dependent variable is the amount of time it takes a person to detect a change in a dial. (Higher numbers mean poorer performance.) People's performance is measured after 1, 2, 3, and 4 hours. Below is a StatView analysis of the data from this experiment. Interpret the results as completely as possible. Be very explicit about the basis for your decisions. Do you have any comments on the design of this study? [15 pts.]

ANOVA Table for Duration

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Subject	12	81.188	6.766				
Category for Duration	3	18.985	6.328	61.122	<.0001	183.367	1.000
Category for Duration * Subject	36	3.727	.104				

Means Table for Duration

Effect: Category for Duration

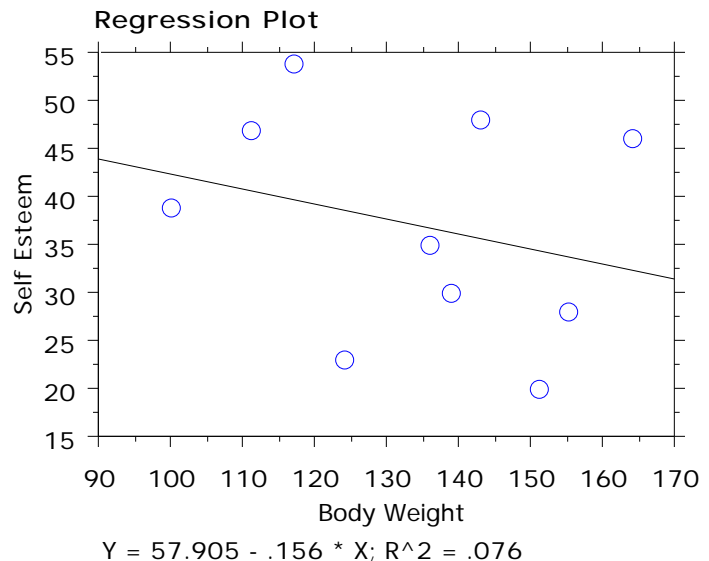
	Count	Mean	Std. Dev.	Std. Err.
1 hr	13	6.300	1.242	.344
2 hrs	13	6.377	1.339	.371
3 hrs	13	7.077	1.448	.402
4 hrs	13	7.792	1.283	.356

7. Dr. Rob D. Cash is interested in the relationship between body weight and self esteem in women. He gives 10 women the Alpha Sigma Self-Esteem Test and also measures their body weight. He analyzes the data using StatView, producing the output below. Interpret the output as completely as you can. If a woman weighed 120 lbs., what would be your best prediction of her self-esteem score? Would you have any comments on the design of this study? [10 pts.]

<u>Participant</u>	<u>Body Weight</u>	<u>Self-Esteem</u>
1	100	39
2	111	47
3	117	54
4	124	23
5	136	35
6	139	30
7	143	48
8	151	20
9	155	28
10	164	46
Sum	1340	370
SS	3814	1214

Regression Summary
Self Esteem vs. Body Weight

Count	10
Num. Missing	0
R	.277
R Squared	.076
Adjusted R Squared	•
RMS Residual	11.838



ANOVA Table
Self Esteem vs. Body Weight

	DF	Sum of Squares	Mean Square	F-Value	P-Value
Regression	1	92.822	92.822	.662	.4393
Residual	8	1121.178	140.147		
Total	9	1214.000			

Regression Coefficients
Self Esteem vs. Body Weight

	Coefficient	Std. Error	Std. Coeff.	t-Value	P-Value
Intercept	57.905	25.958	57.905	2.231	.0562
Body Weight	-.156	.192	-.277	-.814	.4393

8. Given Dr. Cash's study, how likely is it that the sample was drawn from a population whose mean weight (μ) was 140? [10 pts.]