## Spring 1992 First Exam

Question 1

A pilot study that is part of a large research project looks at three particular personality disorders -- schizoid, avoidant, and obsessive-compulsive -- and their relationships to the most frequent type of phobia, agoraphobia. Additionally, the study is interested in looking at gender differences due to the large number of females documented to suffer from agoraphobia compared to males. Subjects have been diagnosed with a particular personality disorder based on results from the Millon Clinical Multiaxial Inventory (MCMI-II), and the frequency and intensity of phobic episodes are measured by the Phobia Rating Scale, which rates a variety of phobias on a scale of 1-10, with a rating of 10 being the most severe.

1. A research assistant is asked by the principle investigator to begin analyzing some of the data that have been collected as part of the pilot study. The p.i. hands the r.a. some data (shown below), but unfortunately has forgotten to label each set of data with the corresponding subject group being analyzed. Before tracking down the p.i., the r.a. decides that she can at least test the omnibus hypothesis with the data given. Show the resulting PRE of this test and whether or not it is significant. (Hint: Write out models C and A and derive the SSE's for each model.)

6 subjects in each group:	Mean	S.D.
	6.4	2.07
	7.7	2.68
	5.1	1.70
	7.2	2.63
	8.4	3.21
	5.8	1.30
overall:	6.8	2.63

2. The r.a. eventually tracks down the p.i. and determines that the data above correspond to the following groups, in order: Schiz/male,
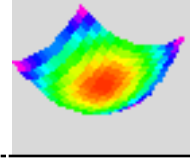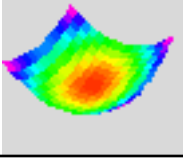
Av/male, Obc/male, Schiz/female, Av/female, and Obc/female. The p.i. is most interested in differences due to diagnosis, regardless of gender, and asks for an analysis of the main effect due to diagnosis, which is to be broken down into a comparison of schizoid vs. avoidant, and obsessive-compulsive vs. the other two diagnoses. Determine if there is a main effect of diagnosis, controlling for the other variables, by answering the following questions:

    a. What are the models A and C that address this question? (Just give us b's or beta's, no need to estimate parameters.)

    b. Write out the values of the codes that examine differences in diagnoses regardless of gender, based on the comparisons outlined above.

    c. What are the values of the parameter estimates associated with these two codes?

    d. State your resulting PRE and F*, and whether they are significant.

3. After looking at the data, the p.i. determines that a post hoc analysis is warranted to examine if the difference between schizoid and obsessive-compulsive diagnoses depends on whether the subject is male or female. What are the values of the codes that would be used to examine this question? What would be the critical value of F for this analysis?

Question 2

Two different genetic strains of animals are exposed to alcohol doses of various magnitudes. One strain was bred for alcohol tolerance; the other was not. Following the administration of alcohol doses to each animal for 20 consecutive days, researchers measure the number of trials required for each animal to learn a reinforced task to some criterion immediately after alcohol ingestion. Six animals from each strain are given each dose level. The following are the cell means:
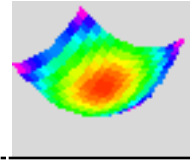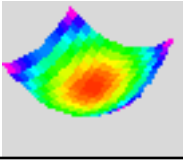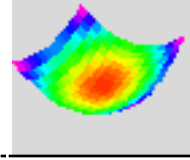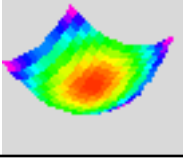
	Dose			
	low	moderate low	moderate high	high
Tolerant Strain	6.5	6.7	7.3	9.2
Non-Tolerant Strain	6.4	7.8	8.8	9.1

A. Using these means, fill in the missing values in the following source table:

	SS	df	MS	F*	Pre
Strain	4.320	1	4.320		.222
Dose					.760
linear		1			
quad	.270	1	.270		.017
cubic	.054	1	.054		.004
DoseXStrain					
linearXStrain	.024	1	.024		.002
quadXStrain		1			
cubicXStrain	.216	1	.216		.014
Error	15.150				

Note that there are 4 SS values to fill in, 3 df values, 5 MS values, 9 F* values, and 3 Pre values. (No need to fill in a row for total between.)

B. Write a paragraph for a results section of a journal article that summarizes what is going on in these data. Draw a figure or two to help you explicate these results.

C. It is important for the researcher to identify at which doses of alcohol the strains differ in performance. After examining the data, the researcher decides that the moderate-low and moderate-high doses are likely candidates. Test the simple effect of strain at moderate-low dose and then test the simple effect of strain at moderate-high dose.

D. The researcher is especially interested in demonstrating that there is a strain difference at the moderate-low dose in a new experiment. However, there are only 20 animals left, 5 tolerant and 15 non-tolerant. If all 20 animals are used in a simple comparison of strains at a moderate-low dose, is there much chance of finding a significant difference? Use the results from the data above as guestimates of the unknown parameters.