Psychology 610 Midterm II
November 18, 2003 Prof. Moore

ID# _____

SHOW YOUR WORK AND WRITE COMPLETE SENTENCES!

1. (5 points each) Respond to each of the following in a few complete sentences (be clear and concise).

   a. Explain the difference between simple effects and main effects.

   b. Draw a hypothetical means plot from a 2 x 2 factorial design showing a main effect of factor A, no main effect of factor B, and no interaction. Draw the levels of factor B along the horizontal axis, and label your plot appropriately.

   c. Name and describe two statistical tests that can help you better understand the source of a significant 3-way interaction.

   d. You think you have a 2 x 3 factorial design with two levels of factor A and 3 levels of factor B, and you present your results (in an ANOVA source table) to your first year project committee. Unfortunately, one of your committee members points out that you are wrong—B is actually nested in A. How can you calculate the F-value for the B/A source quickly without having to "run screaming from the room"? Assume that A and B are both fixed.

   e. What is a benefit of having a random factor in an experiment?

f. State and explain an important assumption of within-participants ANOVA that is NOT also an assumption of between-participants ANOVA.

2. Here's an ANOVA puzzle. Quite a few values are missing, and there is a series of questions that follow.

Source	df	SS	MS	F
Mean	1	400		
A	4	200		5.00
B		10		
C				
A x B			20	
A x C	8			
B x C				
A x B x C	8			
S/ABC		1200		
Total		1930		

a. (15 points) Fill in as many missing values in the table as possible.

b. (5 points) Describe the experimental design in words.

c. (5 points) Write the contrast coefficients that you would use to test the A_{Linear} x $C_{Quadratic}$ two-way trend.

d. (5 points) How many A x C two-way orthogonal trend tests are there?

e. (10 points) Now suppose that the researcher decides to reanalyze the data by pooling across factor C. Recalculate the SS's that will change as a result of this pooling.

f. (5 points) Write the linear model for the original three-way experiment.

g. (10 points) Test whether any contrast involving C could be significant. Briefly describe why or why not.

3. Professor Remedy wants to understand how the body regulates pain. She selects participants suffering from chronic pain. The participants rate their pain daily for a week during which they are given one of three different pain management treatments: (1) pain-relieving drug, (2) massage, and (3) visualization training. Each participant is tested in all of the pain management conditions, and the order of conditions is randomized across participants. The daily pain ratings were averaged to create the scores given here. Higher scores indicate higher pain.

	Drug	Visualization	Massage	Sum	Mean
P1	95	91	75	261	87
P2	100	85	85	270	90
P3	95	89	77	261	87
P4	105	100	83	288	96
P5	95	95	80	270	90
	Sum = 490 Mean = 98	Sum = 460 Mean = 92	Sum = 400 Mean = 80		

a. (5 points) Plot the treatment means.

b. (5 points) Briefly describe the procedure for calculating the standard error of the mean using a separate estimate of the variance for each treatment level (do not calculate—too time-consuming for this exam).

c. (20 points) Professor Remedy's goal is to determine whether either of the two "alternative" therapies is as effective as taking a drug. Calculate the contrasts needed to answer this question. Use the partitioned error term method. State an overall conclusion relevant to Professor Remedy's goal.

d. (5 points) What are the pros and cons of using a partitioned error term to calculate contrasts in a within-participants design?

4. A researcher is interested in how arbitrary social groups influence people's evaluations of others. At the start of the year first year students in a dorm are randomly assigned to one of 6 floors. On each floor half of the students are given t-shirts with one pattern (A) and half are given t-shirts with a different pattern (B). The resident assistants on two floors are told never to refer to the t-shirts. Resident assistants on two other floors are told to use the t-shirt groups to help them organize social activities and to describe the t-shirt groups as "teams." The resident assistants on the last two floors are instructed to organize as many competitions between the t-shirt groups as possible. At the end of 8 weeks of school, half of the students in each t-shirt group are asked to judge (on a 9-point rating scale) how much they would like a (fictitious) new student in the pattern A t-shirt and the other half are asked how much they would like a (fictitious) new student in the pattern B t-shirt.
(Note: t-shirt patterns A and B are arbitrary and different for each floor of the dorm.)

   a. (10 points) What factor or factors are <u>nested</u> in what other factors?

   b. (5 points) What would be the best way to increase the statistical power of the test of the effect of the treatment factor (no mention, team, or competitions)?