STATISTICS 110/201 PRACTICE FINAL EXAM on ANOVA

1. Consider a two-factor experiment in which one factor is "Restaurants" and five restaurants are used in the study. Give a set of circumstances under which the restaurant factor would be considered fixed, and a set of circumstances under which it would be considered random.

2. Sketch a picture of possible cell means for the following scenarios:
a. Factor A has 3 levels, Factor B has 2 levels. There is an AB interaction, but no A or B main effects.

b. Factor A has 3 levels, Factor B has 2 levels. There is an effect for Factor A, but no interaction and no Factor B effect.

3. A study was done to see if meditation would reduce blood pressure in patients with high blood pressure. There were 100 people available for the study. Half of the patients were randomly chosen to learn meditation and told to practice it for half an hour a day. The other half was told not to alter their regular daily routine. Blood pressure measurements were taken at the beginning of the study, after 5 weeks, and after 10 weeks.

a. Specify the factors in this study, and for each one, state whether it is fixed or random, and the number of levels.

b. Specify whether the factors are crossed or nested with the other factors.

c. Why was it important to include a group that was told to continue their regular routine, rather than just have everyone learn meditation?

4. Comment briefly on the following statements:
a. In one factor ANOVA where the factor is fixed, a highly significant F* ($p < .001$) indicates that the k population means, $\mu_1, \ , \mu_k$ are all different.

b. In one factor ANOVA, we need to use multiple comparisons (like the Tukey procedure) because it is impossible to compare k means all at once.

5. A student analyzed data for a one-way analysis of variance situation for which there were 3 levels of the factor, and 21 people measured at each level. Unfortunately, after running the analysis, the student lost the computer output. She said "All I remember is that one of the mean squares was 100 and the other one was 500, but I can't remember which was which. Oh, and I remember that the p-value for the test was about .01."

a. Based on this information, can you construct the analysis of variance table? (I've provided headings to remind you of the table structure.) If so, fill it in. If not, explain why not. If you think you can partially fill it in, do that.

Source	SS	df	MS	F*	p-value

b. In the statement of the question, it wasn't specified whether the factor was fixed or random. Write the null and alternative hypotheses being tested in each of the two cases. Make sure you define any symbols you use.