**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**NOTE: Type your answers in the appropriate fields; please make answer fields larger as needed. Please turn in a printed copy to Melissa after next Tuesday’s lecture or Melissa’s mailbox by 12 PM next Tuesday (please contact Melissa regarding exceptions; e.g., illness and travel). Please note, assignments will lose 5% of the total possible points for each day they are late.**

*Conceptual Problems*

1. Imagine you had a factorial design in which you were testing if work schedule (none vs. part-time vs. full-time) and course load (part-time vs. full-time) were related to student GPA during an academic quarter. If I told you that this was a balanced design, where each unique combination of conditions (e.g., no work and part-time student status) had 15 participants. What are the *df* between for each condition, the *df* for the interaction, the *df* within (error) and the *df* total?

2. What are the potential advantages of a factorial ANOVA design? Four are mentioned in your lecture notes. Explain, in your own words, why factorial ANOVA can result in these potential advantages.

3. Give a short example of a hypothetical one-way ANOVA design and demonstrate how a factorial ANOVA design could result in the advantages dicussed in question 2.

4. In your own words, describe what simple-effects analyses do and when you would use them?

5. A significant interaction effect suggests that there is a dependency of effect between two conditions. Given this definition, if there is a significant interaction effect does it make sense to interpret main effects of the conditions with the significant interaction? Defend your position (i.e., why or why not).

*Computer Problem*

Imagine that you are asked to help analyze some data. A fitness magazine wants to show that women should participate in more intense weight training programs, and that light vs. heavy lifting programs will not cause women to “bulk up.” To test this they recruited 60 volunteers to engage in a 60 day transformation program. Half the participants were male, the other half were female. Male and female participants were randomly assigned to participate in either a light or heavy lifting program. The light lifting program focused on endurance—being able to perform more repititions of the same weight volunteers could lift when they started. The heavy lifting program focused on increasing the maximum amount of weight volunteers could lift—the goal was to increase their starting max by 300% by the end of the 60 days.

Use the data set (hw06data.csv) from the study to answer the following questions. The outcome variable is labeled pctgain, these values indicate the percent of lean muscle mass gained by the end of the 60 day program. The predictor variables are biosex and workout. Biosex indicates the biological sex of the volunteers (m = male, f = female), and workout indicates the workout condition the volunteers were randomly assigned to (light = the light workout condition, heavy = the heavy workout condition).

1. Descriptive statistics

A*. Sample Size*

How many volunteers were assigned to each lifting condition overall?

How many female volunteers were assigned to each lifting condition?

How many male volunteers were assigned to each lifting condition?

B. *Percent Gain Descriptives by Conditions*

What are the mean and standard deviation of percent gain overall, for each condition, and for all condition interactions? I recommend making a table of these descriptives.

Work/Syntax:

Answers:

2. State the null and alternative hypothesis for tests of the main effects of biological sex, lifting condition, and their interaction.

3.

a. Conduct a factorial ANOVA testing the main effect of biological sex, lifting condition, and their interaction.

b. What conclusions do you reach? Explain these in terms of the study. Make sure you incorporate reporting of your statistical analyses into your conclusion.

Work/Syntax:

Answers:

4. Conduct appropriate follow-up analyses. If you had a significant interaction, use simple effects to determine what the effects are of lifting condition based on biological sex. If there was no significant interaction, evaluate any significant main effects of the predictor and IV.

a. Conduct the appropriate follow-up analyses.

b. Report your conclusions as you would if you were writing them for a peer reviewed journal. You may use tables to help report your statistical findings if you think it is appropriate. Please make sure your conclusions are in the context of the experimental scenario presented.

Work/Syntax:

Answers: