**Your name here: Krista Miller**

**Question 1: Using the notation convention you learned, please write out how these designs would be denoted. If there are more than two grouping variables, you can assume that the design is factorial.**

1) A chemist wants to test the reactivity (measured by amount of heat emitted) of four chemicals at different temperatures (freezing point of water, “room temperature”, and boiling point of water)

Answer: 4 x 3 factorial study

4 chemicals x 3 temperatures= 12 combinations of temperature and chemical

2) A public health organization wants to test the effectiveness (measured by the self-reported likelihood of engaging in certain healthy behaviors in the future) of a public service announcement campaign. They show 16 versions of a television ad, systematically varying the gender of the speaker (man or woman), whether or not the speaker identifies as being part of a certain group (no identification or direct identification), and what healthy behavior the speaker recommends to the audience (4 behaviors)

Answer: 2 x 4 x 2 factorial study

2 (genders) x 4 (behaviors) x 2 (group identifications) = 16 combinations of this ad campaign

3) An elementary school gym teacher wants to test the effectiveness of weekly running drills (measured by how quickly students can run one mile at the end of the term). She has one group of students run fast for short intervals and another group run slowly for long intervals.

Answer: Not a factorial study; 2 speeds (only one factor)

**Question 2: Answer the following yes/no questions about two-way factorial ANOVA with interactions.**

1. Let’s say that I have two significant main effects. Does that mean that I must also have a significant interaction?

Answer: No. Two significant main effects does not mean that a significant interaction is also present. The p value for Factor A \* Factor B can be calculated to see if the interaction between the effects is also significant. A plot of parallel lines is also a visual cue that the two effects are not related.

1. Let’s say that I have a significant interaction. Does that mean that at least one main effect needs to be significant?

Answer: No. Three can be no overall effect of either Factor A or Factor B, but there can be a ‘crossover interaction’, meaning the effect of B on the dependent variable is opposite, depending on the value of Factor A.

1. Let’s say that I conduct tests of all four simple effects before I test for the interaction. If any of these are significant, does it mean that I must also have a significant interaction?

Answer: Yes. if there is a significant simple effect, than that indicates that there is also a significant interaction.

Real answer: No. Video @ :25 minutes dated 1/19.

**Question 3:**

Come up with an example of a research context where a natural nesting/clustering structure may cause non-independence among observations and briefly write about it below. Make sure you explicitly state what the nesting/clustering structure is. You may use the examples in the async and in the live session as a guide, but please come up with a different example than those used in these sources.

Example from live session: I’m interested in the relationship between parental alcohol abuse and depression in children. I collect data from children who have at least one alcoholic parent. To make data collection easier because this is a somewhat difficult population to access, I also collect data from any siblings a given child has.

Nesting/clustering structure: Siblings are nested within sets of parents (or, stated differently, siblings are clustered within families). Because of this, observations that come from children who are siblings are non-independent.

Your answer: The relationship between the price and square footage of houses in Los Angeles, California. Because there are areas of town that have few listings, I create clusters of neighborhoods, which share non-independence due to zip code location.