

**Sample Examination Questions for 205B Final Exam
Spring 2006**

- 1) Terry and Jane are both interested in the relationship between different kinds of dispositional love – attachment and compassion – as measured by scores on trait scales, and performance on a stressful task. Terry and Jane both have trait scores for each emotion for every participant, as well as a score for the stressful task performance. In Jane’s analysis, she instructs the SPSS program to do a “forward stepping” analysis looking at the two emotion predictors. In Terry’s analysis, she instructs SPSS to enter two blocks of predictors – first attachment, then compassion – in that order.
 - a) How will the actual analyses performed by the program differ in these two cases?
 - b) What research question is Jane most likely trying to answer?
 - c) What research question is Terry most likely trying to answer?
 - d) In what kind of situation is each of these approaches appropriate?

- 2)
 - a) What does the term “independent variable” mean?
 - b) Can a naturally occurring (not experimentally manipulated) variable be an independent variable in a particular study? Why or why not, and if so, under what circumstances?

- 3) Briefly describe two strengths and two weaknesses of each of the following, as presented in class:
 - a) experimental research designs
 - b) correlational research designs
 - c) Differentiate between internal and external validity, and describe examples of research studies that have problems with each.

- 4) What is the difference between a moderator and a mediator? In your answer, be sure to define both terms, and describe the statistical tests used in each case.

- 5)
 - a) Maria is analyzing data from a 3 x 2 x 2 study of bargaining behavior. The first variable is culture (U.S. Caucasian vs. U.S. Asian vs. Chinese sample). The second is an experimental manipulation, and the third is participant sex. All variables are between-subjects. Create a coding system that includes vectors needed to test the main effects of each of the three variables.

 - b) Maria is interested specifically in an interaction between two of the three culture levels (U.S. Caucasian and Chinese) and the experimental manipulation. Create a vector or set of vectors that specifically addresses this interaction contrast. Maria runs a linear regression analysis in SPSS that tests the significance of the predictive value of this/these vector(s) alone. What parts of the resulting output can be assumed accurate, according to the analysis strategies we have discussed in

- class? What parts are inaccurate, and why? What should Maria do to correct the inaccuracies?
- 6) An undergraduate honors student is studying the interaction between experimentally manipulated teaching strategy (textbook vs. observation) and reading aptitude (as operationalized using a scale score from a test) in predicting improvement in ice skating. Thus, one variable is dichotomous, and the other continuous. She has been told that she should analyze the data by splitting the continuous variable at the median, creating two groups “high” and “low” on reading aptitude, and perform a factorial ANOVA. Explain to her why this strategy is incorrect, and explain the appropriate approach.
- 7) Why is it that a dichotomous variable can NOT correlate perfectly ($r = 1.00$) with a continuous variable (assuming that the continuous variable has three or more possible scores represented in the data set)?
- 8)
- Explain the difference between level of statistical significance and effect size.
 - What is a test of statistical significance?
 - What does it mean to say that a relationship or effect is statistically significant?
 - Define “error” as it applies to significance testing in ANOVA and MRC.
 - Choose *three* of the following five error terms, and for each, describe conceptually what it represents and the type of analysis in which it is appropriate: S/A, B x S, B x S/A, $(1 - R^2_{Y,max})$, $(1 - R^2_{effect})$.
- 9) Again, we return to one of our favorite experiments with the hubba hubba fish. As you may recall, that study involved a 3 x 2 design, with four fish in each condition. However, a close examination of the experimental records reveals that the records of three of the fish were fictitious – made up by an inexperienced lab assistant when the recording equipment failed. Rather than discard the entire study, the researcher decided to discard the three sketchy scores from the data set (as well as the lab assistant) and analyze the data with the remaining fishes.
- Was the researcher justified in analyzing this modified data set? Explain.
 - Describe two approaches that could be used to analyze these data. What are the advantages and disadvantages of each approach?
- 10) Suppose we are interested in studying academic salaries (Y), and we have the following data as predictors: productivity as measured by number of publications ($X1$); seniority as indexed by years since Ph.D. ($X2$); and gender ($X3$). Given this data set:
- present a theoretical rationale for conducting an analysis of partial correlations, indicating clearly why a particular X variable (or set of X variables) is being partialled out;
 - present a theoretical rationale for conducting a simultaneous MRC;
 - present a theoretical rationale for conducting a stepwise MRC;
 - present a theoretical rationale for conducting a hierarchical MRC, and describe the analysis.

11)

- a) What is reliability of measurement, as defined by classical test theory?
- b) Name and describe three methods for estimating the reliability of a measurement instrument. What is one advantage and one disadvantage of each method?
- c) Why is it important to use a reliable measure of an experiment's dependent variable?
- d) What is the relationship between reliability and validity?

12) An experiment has a between-subjects, quantitative independent variable that has four ordered levels. The levels are equally spaced (e.g., 2, 4, 6, 8). You have decided to analyze the data using MRC. First, suppose that you want to conduct a trend analysis using orthogonal polynomial coefficients.

- a) What is the highest order of trend (linear, quadratic, cubic, quartic, etc.) that you could fit to this design? How do you know?
- b) Would you need to conduct a hierarchical analysis to find the proportion of variance accounted for by each contrast? Why or why not?
- c) Would you need to conduct a hierarchical analysis to find the proportion of error variance? Why or why not?
- d) What is an equation or mathematical expression that you could use to calculate the degrees of freedom for the error term?

Now suppose you want to repeat the trend analysis using powered vectors (rather than orthogonal polynomial contrasts).

- e) How could you create the powered vectors?
- f) How could you determine the proportion of variance accounted for by the quadratic order of trend?
- g) How could you determine the proportion of error variance?