

## Review topics for Exam 1 HSTA 559, Spring 2011

All the following topics are worthy of your review for the first exam. For each one, see handouts as well as class notes, and often links on our wiki, to provide relevant information. The exam will include several open-ended questions, and some that require only brief answers. Minor computation will be required, so you might want to bring a hand calculator to the exam. (Computers will not be allowed.) You will be expected to demonstrate theoretical understanding as well as practicality in data analysis, not unlike what has been emphasized in your homework. In a few cases graphics will be given and you will be asked to interpret them. Be sure you study all graphics for topics listed below, several of which were examined in some detail and also included in your homework. Bring your notes and pdfs of interest to the exam, because it will be *open-book and open-notes*; you will not have to memorize any formulas. Be sure to examine the syllabus, especially near the end for specific examples of questions. Also, ask questions on our wiki (on the new page for March Comments and Questions) and try to answer questions of others when you can... I will review any answers and provide elaborations or correctives as needed.

### Topics

Computing and interpreting simple univariate and bivariate statistics

Continuous variables (symmetric and non-symmetric)

Statistics pertaining to the center, spread and (briefly on) association

Visualization and graphics (how many can you identify? and describe?)

Visualization and graphics more generally, as a conceptual topic

Comparing two Groups:

Independent samples (in experiments and observational studies)

Main statistics and graphics for two group comparisons

Mean differences, *effect sizes*, t- and F-statistics

Alternative graphics (how many can you identify? and describe?)

What are the key concepts or procedures related to interpretation of derived statistics or plots?

*e.g.*, Why is randomization often recommended?

What is lost without randomization?

What is meant by the term 'choice of metric' when comparing groups?

Dependent sample case.

How does the dependent sample case generally differ from the independent one?

Be able to distinguish four main types (1a, 1b, 2a & 2b) in Jour. of Stat. Educ.

article you read; also, be able to interpret granova.ds graphics, and related numerics.

Describe the role of dependency, for all major 'paradigms', including related details

Comparing several groups:

One-way ANOVA

Main statistics and graphics for k-group comparisons; what are 'effects'?

Distinguish descriptive and inferential uses of one-way ANOVA

What is the statistical logic underlying the standard F test for this case? Explain in detail.

Planned comparisons (see your handouts)

Be prepared to give examples of when or where PCs would be likely to be helpful.

Be able to assess whether two contrast vectors are mutually orthogonal or not.

How do t-statistics for certain PCs relate to the omnibus F statistic? Explain.

Two-way and higher order ANOVA

What is the role of blocking? Elaborate. (Be able to give good examples)

What are row and column effects? How are they generally assessed?

What is a (row or col) main effect?

What are interactions? Be able to interpret, generally, and for examples.

What are orthogonal polynomial contrasts? Helmert contrasts?

How can metric choice influence results? When might you want to transform the response variable? Explain.

Bootstrapping. What is it? What is its main rationale or purpose? Be able to give examples of its usefulness, or interpret key results.