Mid-Term Exam Outline  
October 7, 2004  
Vartanian: SW 540

1. Levels of measurement. Know the properties and be able to identify each of the different levels.

   A. Nominal Scales  
   B. Ordinal Scales  
   C. Interval Scales  
   D. Ratio Scales

2. Rates of change.

3. Frequency distributions. Difference between f and F. Be able to chart these.

4. Know how to compute and understand the mean, median and mode. Know how to determine the mean of grouped data.

5. Standard Deviation (SD). Be able to describe what the SD tells us and be able to compute a standard deviation.

6. Know the properties of the normal curve.

   Understand the area underneath the normal curve and be able to calculate the percentage of curve above or below a particular value, given the mean and standard deviation.

7. Understand the difference between a causal relationship and a covariational relationship.

8. Understand the difference between type I and type II errors. Know how to determine the likelihood of a type I error. Know what happens to the likelihood of a type II error when you decrease the likelihood of a type I error.

9. Understand null and research hypotheses. Know what you are testing in a statistical test. Is it possible to accept the research hypothesis?

10. Understand the difference between a sample and a population.

11. Understand how to test the difference in means for interval scale variables.
    For large samples – use a z test. For small samples – use a t test.

Remember, when testing the difference in means against some hypothesized value, you will use a particular formula for the standard error (see p.1 from the Lecture 4 handout). When testing the difference of means of two groups, you must determine if the variances of the two groups are the same or not. You’ll use an F-test to determine whether to use the equal or unequal variances assumption. You’ll then test the differences in means.
12. Understand how to test for differences in proportions
   A. For large samples – use the z test
   B. For small samples – use the binomial distribution

13. Understand how to use probability tables derived from binomial distributions in testing significance.

14. Know how to determine confidence intervals for the mean and the difference in means or proportions. Understand what a 99%, 95%, 90% confidence interval means.

15. Linear regression and least squares.
   A. What is the a coefficient estimate
   B. What is the b coefficient estimate
      1. Know how to calculate a slope.
      2. Understand what is meant by the slope and how this is different from the correlation coefficient.
   C. When testing for significance, understand what you are testing: $H_0: B=0$
   D. Understand the disturbance or residual term.
      1. Why do we have it?
      2. How is it measured?
      3. What is the expected value of the error term?
   E. How is the standard error computed and what is the meaning of the standard error for the b coefficient estimate?
   F. Understand the properties of least-squares regression.
      1. Efficiency
      2. Unbiasedness
   G. How do we get the least-squares line?
   H. What is the total sum of squares equal to? Be able to explain and compute the total, explained and the unexplained sum of squares.
   I. Understand how to interpret coefficients from dummy variables. Know the difference between coefficient estimates for dummy variables and interval/ratio scale variables.
   J. Know how to estimate predicted values when using dummy variables.
   K. Understand how to determine confidence intervals for the slope and how to determine whether or not a slope is significant or not (using a t-test). Know how to read the t-table.

16. What is the correlation coefficient?
   A. How is it different from the covariance and from the slope?
   B. What is the meaning of $R^2$?
   C. Know how to calculate an $R^2$ value.
   D. Know how to test whether the correlation coefficient is significant – using the F test.
17. Understand what statistical power is and how to increase the level of statistical power.

18. SAS
   A. know how to read data into sas;
   B. know how to create a sas data set.

19. Understand the tables from the Corcoran and Kunz article.