EDUC/PSY 6600
Pretest Study Guide

The EDUC/PSY 6600 pretest, which is administered over WebCT, consists of 30 randomly selected test questions from a large test bank. The content of the pretest is based on the objectives of the Psychology 2800 course, which are as follows:

To understand the selection, computation, and interpretation of descriptive and inferential statistics, including:

1) Organizing, describing, transforming, and graphing data
2) Measures of central tendency and variability
3) The normal distribution
4) Hypothesis testing and estimation with 1 and 2 samples
5) One-Factor ANOVA; and subsequent post hoc, multiple comparison procedures
6) Correlation; simple linear regression
7) Chi square tests for frequencies for 1 and 2 samples

To successfully pass the pretest, students should be able to define the terms and concepts listed below at a basic level. Additionally, students should know how to compute the following by hand: basic math (equivalent to high school algebra), mean, median, mode, range, standard error of the mean, and z-scores. A score of 70% correct is required to pass the pretest. Students who need additional preparation for the test should review a good introductory statistics text such as *Essentials of Statistics for the Behavioral Sciences* (5th Ed.) by Gravetter and Wallnau, which is the required text for Psychology 2800.

1. Basic Concepts

a. The goals of users of statistics: to organize, summarize, and describe numeric information and to make inferences from the data
b. Populations and Samples
c. Parameters and Statistics
d. Variables
e. Continuous and Categorical variables
f. Independent and Dependent variables
g. Measurement scales
    i. Nominal
    ii. Ordinal
    iii. Interval
    iv. Ratio
h. The summation symbol, Σ ("sigma"), summation notation, and rules for summation

2. Frequency Distributions

a. Advantages of organizing data into a frequency distribution

b. Intervals of a frequency distribution
c. Histograms
d. Shapes of distributions
    i. Normal
    ii. Skewed
    iii. Flat or peaked
e. Characteristics of the standard normal distribution

3. Measures of Central Tendency

a. The purpose of using measures of central tendency
b. Mean
c. Median
d. Mode
e. Formula for the mean
f. Advantages, uses, and limitations of mean, median, and mode
g. Respective symbols for the population and sample mean

4. Measures of Variability

a. The concept of variability of scores in a distribution
b. Range
c. Deviation scores
d. Sum of squared deviation scores or "Sums of Squares"
e. The variance and the standard deviation
f. Difference between population and sample formulae for the variance and standard deviation
g. Respective symbols for the population and sample variance/standard deviation

5. z-scores

a. z-scores as a standard way of describing a score's position within a distribution
b. Converting a raw score to a z-score
c. Converting a z-score to a raw score
d. Interpreting positive and negative z-scores
e. Interpreting a z-score of zero

6. Probability, Random Samples, and the Sampling Distribution of the Mean

a. Random samples
b. Independent vs. dependent samples
c. Random sampling vs. random assignment
d. Sampling error
e. Central Limit Theorem and the mean and variance of a sampling distribution
f. Distribution of sample means or "sampling distributions"
g. Standard Error of the Mean
h. The relationship between sampling error, n-size, and the Standard Error of the Mean

7. Hypothesis Testing

a. Research hypotheses vs. statistical hypotheses
b. Null and alternative hypotheses: What does each hypothesis state?
c. Tests of statistical significance, critical values, and how to decide whether a result is likely given the null hypothesis
d. Kinds of errors that can be made in interpreting *p* values from tests of statistical significance
    i. Type I error
    ii. Type II error
e. The α-level or Type I error rate
f. Directional (one-tailed) vs. non-directional (two-tailed) hypotheses
g. The relationship between sample size and statistical significance
h. Situations in which a one-sample z-test might be used

8. The t Statistic and the One-Sample t-test

a. Situations in which the t-test is used instead of the z-test
b. The null hypothesis for the one-sample t-test

9. The Independent-Samples t-test and the Dependent-Samples t-test

a. Situations in which an independent samples t-test is used
b. The null hypothesis for the independent samples t-test
c. Situations in which a dependent samples t-test is used
d. Effect sizes: Using Cohen's *d* or the point-biserial correlation coefficient to describe the magnitude of the mean difference

10. Estimation

a. Confidence intervals
b. The relationship between the precision of an estimate, the standard error of the mean, and the width of confidence intervals
c. Relationship of confidence intervals to hypothesis testing

11. One-Factor Analysis of Variance (ANOVA)

a. Situations in which Analysis of Variance is used instead of an independent samples t-test
b. The null hypothesis in ANOVA
c. Components of the ANOVA table
    i. Sums of Squares
    ii. Mean Squares
    iii. F-ratio or F-statistic
d. Interpretation of a statistically significant F-ratio in ANOVA
e. Multiple comparison methods for testing individual pairs of means
f. Effect size: r^2 (eta squared or η^2)

12. Correlation and Simple Regression

a. The meaning of correlation between two variables
b. Situations in which the Pearson correlation coefficient might be used
c. Interpreting the correlation coefficient
d. Situations in which regression is used
e. The regression equation
    i. Interpretation of the intercept and slope coefficients
    ii. Using the regression equation to predict a value for the dependent variable

13. Chi-Square Tests for one and two variables: Tests of Goodness of Fit and Independence

a. Situations in which a Chi-square Goodness of Fit test is used
b. Situations in which a Chi-square Test of Independence is used
c. Effect size: phi coefficient and Cramer's *V*