

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