Test Objectives for Math 1040

Elementary Statistics 12th edition, by Mario Triola

Chapter 1
Understand the basic concepts of critical thinking and terminology used in statistics
Understand the difference between a parameter and a statistic
Understand the difference between and uses of categorical and quantitative data
Understand the differences between discrete and continuous data
Understand the different levels of measurement
Understand the differences between an observational study and an experiment
Understand the completely randomized, randomized block, and matched pairs methods of
         experimental design
Understand the various methods for obtaining a sample
Understand cross-sectional, retrospective, and prospective studies
Understand the different types of error
Understand confounding

Chapter 2
Be able to interpret and create frequency and relative frequency distributions
Be able to interpret and create frequency and relative frequency histograms
Understand the shape of a distribution and interpret the meaning of skewness
Be able to construct and interpret a stemplot
Be able to construct and interpret a scatter plot for paired data
Understand and create bar graphs, dotplots, pie charts, Pareto charts, and time series plots
Identify ways in which a graph can be deceptive

Chapter 3
Find and interpret the measures of center for a data set or frequency table using your calculator
Find and interpret the measures of variation for a data set or frequency table using your calculator
Understand the Empirical Rule and the Range Rule of Thumb
Find and interpret the *z*-score for a given data value
Find quartiles in a data set
Understand the meaning of percentiles
Find the 5-number summary for a data set
Be able to create and interpret the box plot for a data set
Interpret the shape of a box plot
Be able to calculate the interquartile range (IQR)
Be able to identify the outliers of a data set and understand their effect on the distribution

Chapter 4
Understand the notation and terminology used for probabilities
Be able to compute probabilities given sample data (relative frequency approach)
Be able to list the simple events of a small sample space
Be able to compute probabilities using the classical approach
Be able to use the Addition Rule
Know when an event is considered unusual

Understand the Law of Large Numbers
Understand the Rule of Complementary Events
Understand what it means for events to be disjoint or not and how this affects probability
Understand what it means for events to be independent or dependent and how this affects probability
Understand the conditions in which dependent events can be treated as independent for the ease of calculation
Understand how to calculate the probability of "at least one" by using the complement
Be able to use the Multiplication Rule
Understand and be able find conditional probabilities
Understand when to use factorials, permutations, and combinations for counting
Be able to use your calculator for finding values of factorials, permutations, and combinations
Be able to use the permutations formula when some items are identical to others
Use counting techniques to evaluate probabilities

Chapter 5
Understand and use the terminology used for probability distributions
Understand the requirements for a probability distribution
Understand the difference between a discrete and a continuous random variable
Be able to graph a probability histogram
Be able to find and interpret the mean, the variance, and the standard deviation of a discrete probability distribution
Be able to find and interpret the expected value of a discrete random variable
Be able to use probabilities to determine if an event is unusual
Know the requirements for a binomial probability distribution
Know the notation used for binomial probability distributions
Be able to find a binomial probability using the formula as well as by using Table A-1
Be able to find and interpret the mean, variance, and standard deviation of a binomial probability distribution
Determine if a binomial probability is unusual

Chapter 6
Understand the difference between a discrete and a continuous probability distribution
Understand, interpret, and find probabilities using a uniform probability distribution
Understand and interpret the standard normal probability distribution
Understand the relationship between a z-score and a probability
Be able to find z-scores and probabilities using the standard normal distribution Table A-2
Know the formula for a z-score and be able to solve for any variable in the formula
Be able to find probabilities and z-scores for any normally distributed continuous random variable
Understand the meaning of a sampling distribution
Understand the meaning of an estimator and an unbiased estimator
Understand and apply the Central Limit Theorem as it applies to finding the shape, center, and spread of a sampling distribution
Understand and apply the Central Limit Theorem for finding probabilities involving sampling distributions

Chapter 7
Understand the difference between a point estimate and an interval estimate of a parameter
Use the Standard Normal table to find critical values for a given confidence level

Construct a confidence interval for a population proportion
Find the minimum sample size needed to estimate a population proportion
Understand the properties of the t distribution
Use the *t* Distribution table (table A-3) to find critical values for given confidence level
Understand the difference between a z-score and a t-score and when to use them
Construct a confidence interval for a population mean with or without a known value of σ
Find the minimum sample size needed to estimate a population mean
Understand the properties of the chi-square distribution
Use the chi-square distribution to find critical values for a given confidence level
Construct a confidence interval for a population variance or standard deviation
Interpret the meaning of a confidence interval
Understand how changes in variables such as sample size or confidence level will change the margin of error and the width of the confidence interval

Chapter 8
Understand the logic and meaning behind hypothesis testing
Understand and identify Type I and Type II errors
Understand and use both the P-value method and the Critical Value method of hypothesis testing
Use both the Standard Normal and the t distribution tables to find critical values and P-values
Test a claim about a proportion or about a mean
Draw conclusions about the null hypothesis and the claim based on the results of a hypothesis test

Chapter 10
Understand the concept of linear correlation in bivariate data
Understand the difference between correlation and causation
Be able to create a scatterplot for bivariate data
Use a calculator to find the correlation coefficient *r*
Understand the meaning of the correlation coefficient and how it relates to positive and negative linear relationships in bivariate data
Use Table A-6 to find critical values of the correlation coefficient and determine whether a significant linear relationship exists
Use a calculator to find the equation of the regression line that best fits given bivariate data
Understand the conditions under which the regression equation will provide valid predictions
Use the regression equation to make predictions
Understand the use of slope to represent marginal change
Understand how influential points affect linear correlation