

AP Statistics gives students hands-on experience collecting, analyzing, graphing, and interpreting real-world data. They will learn to effectively design and analyze research studies by reviewing and evaluating real research examples taken from daily life. The next time they hear the results of a poll or study, they will know whether the results are valid. As the art of drawing conclusions from imperfect data and the science of real-world uncertainties, statistics plays an important role in many fields. The equivalent of an introductory college-level course, AP Statistics prepares students for the AP exam and for further study in science, sociology, medicine, engineering, political science, geography, and business.

This course has been authorized by the College Board to use the AP designation.

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Length: Two semesters

## UNIT 1: DESCRIBING DATA

### LESSON 1: WHAT IS STATISTICS?

#### **Discuss: Introductions**

Introduce yourself to your classmates and your instructor.

Duration: 0 hrs 15 mins Scoring: 10 points

#### **Discuss: Errors in Ads (and Other Claims)**

Discuss ads containing statistical errors, abuses, and misleading statements.

Duration: 0 hrs 30 mins Scoring: 10 points

#### **Study: Welcome to Statistics**

Explore the history of statistics. Examine the main types of statistics and the types of data used in statistics.

Duration: 0 hrs 50 mins

#### **Practice: Welcome to Statistics**

Answer questions about the history of statistics, the main types of statistics and the types of data used in statistics.

Duration: 0 hrs 30 mins

#### **Quiz: Types of Data, Types of Statistics**

Answer questions on differentiating between counts vs. measures (that is, discrete vs. continuous data), numerical vs. categorical data, and inferential vs. descriptive statistics.

Duration: 0 hrs 50 mins Scoring: 10 points

#### **Practice: Identifying Types of Data and Statistics**

Apply your knowledge to explain why a given study is descriptive or inferential and to identify categorical and numerical data.

Duration: 1 hr Scoring: 25 points

### LESSON 2: DISPLAYING DISTRIBUTIONS WITH GRAPHS

#### **Quiz: Variables and Distributions**

Answer questions to familiarize yourself with statistical terms such as variable and distribution.

Duration: 1 hr Scoring: 10 points

#### **Practice: What Can You Tell From Graphs?**

Use information from various kinds of graphs to answer questions.

Duration: 1 hr Scoring: 25 points

#### **Discuss: Choosing Appropriate Graphs**

Discuss which type of graph is best for displaying a given data set and why.

Duration: 0 hrs 30 mins Scoring: 10 points

### **Study: Introduction to Frequency Data and Their Graphs**

Explore the different kinds of frequency plots, including histograms, relative frequency plots, cumulative frequency plots, cumulative relative frequency plots, and bar graphs.

Duration: 0 hrs 50 mins

### **Practice: Introduction to Frequency Data and Their Graphs**

Answer questions about the different kinds of frequency plots, including histograms, relative frequency plots, cumulative frequency plots, cumulative relative frequency plots, and bar graphs.

Duration: 0 hrs 30 mins

### **Quiz: Matching Graphs and Tables**

Answer questions based on tables and graphs. Match tables with graphs derived from the same data.

Duration: 0 hrs 50 mins Scoring: 10 points

### **Practice: Introduction to Stem-and-Leaf Plots**

Research stem-and-leaf plots and back-to-back stem-and-leaf plots. Practice creating them.

Duration: 1 hr

### **Quiz: Stem-and-Leaf Plots**

Answer questions about stem-and-leaf plots.

Duration: 0 hrs 50 mins Scoring: 10 points

### **Study: Histograms, and Making Them on Your Graphing Calculator**

See how histograms are related to stem-and-leaf plots. Create histograms on your graphing calculator.

Duration: 1 hr

### **Practice: Histograms, and Making Them on Your Graphing Calculator**

Answer questions about how histograms are related to stem-and-leaf plots and about histograms on your graphing calculator.

Duration: 0 hrs 30 mins

### **Discuss: Histograms**

Discuss how best to display data with a histogram.

Duration: 0 hrs 30 mins Scoring: 10 points

### **Quiz: Identifying Shapes of Distributions**

Answer questions about uniformly distributed distributions, bimodal distributions, symmetric and mound-shaped distributions, distributions skewed to the left or to the right, clusters, gaps, and outliers.

Duration: 1 hr Scoring: 10 points

## **LESSON 3: DESCRIBING DISTRIBUTIONS USING NUMBERS**

### **Study: Populations and Samples, Parameters and Statistics**

Examine the distinction between a population and a sample, and between a parameter and a statistic. Go over the basics of random sampling.

Duration: 0 hrs 50 mins

### **Practice: Populations and Samples, Parameters and Statistics**

Answer questions about the distinction between a population and a sample, and between a parameter and a statistic.

Duration: 0 hrs 30 mins

### **Quiz: Populations, Samples, Parameters, Statistics**

Answer questions about whether a given data set is a sample or a population and about whether a value is a statistic or a parameter.

Duration: 0 hrs 40 mins Scoring: 10 points

### **Study: Measures of Central Tendency**

See how to calculate the three measures of center (the mean, the median, and the mode). Explore the strengths and weaknesses of each.

Duration: 0 hrs 50 mins

### **Practice: Measures of Central Tendency**

Answer questions about how to calculate the three measures of center (the mean, the median, and the mode). Answer questions about the strengths and weaknesses of each.

Duration: 0 hrs 30 mins

### **Practice: Differences Between Mean and Median**

Calculate means and medians for different distributions (some with outliers), and answer questions about the differences between them.

Duration: 1 hr 30 mins Scoring: 25 points

### **Study: Measuring Variation**

Explore a technique for measuring variation: the standard deviation. Go over the distinction between the population standard deviation and the sample standard deviation.

Duration: 0 hrs 50 mins

### **Practice: Measuring Variation**

Answer questions about a technique for measuring variation: the standard deviation, and the distinction between the population standard deviation and the sample standard deviation.

Duration: 0 hrs 30 mins

### **Practice: Standard Deviation and Variance**

Calculate standard deviations and variances.

Duration: 1 hr 30 mins Scoring: 25 points

## **LESSON 4: FIVE-NUMBER SUMMARIES**

### **Study: Box-and-Whisker Plots and the Five-Number Summary**

Go over box-and-whisker plots and the five-number summary (minimum,  $Q_1$ , median,  $Q_3$ , and maximum). Learn the definition of *outlier*.

Duration: 0 hrs 50 mins

### **Practice: Box-and-Whisker Plots and the Five-Number Summary**

Answer questions about box-and-whisker plots and the five-number summary (minimum,  $Q_1$ , median,  $Q_3$ , and maximum). Learn the definition of *outlier*.

Duration: 0 hrs 30 mins

### **Quiz: Box-and-Whisker Plots and the Five-Number Summary**

Construct box-and-whisker plots and modified box-and-whisker plots. Answer questions about the minimum,  $Q_1$ , median,  $Q_3$ , maximum, and outliers.

Duration: 0 hrs 50 mins Scoring: 10 points

### **Practice: Box-and-Whisker Plots and Modified Box-and-Whisker Plots for the Graphing Calculator**

See how to create a standard and modified box-and-whisker plots on a graphing calculator and interpret the results.

Duration: 0 hrs 30 mins

### **Practice: Working With Box-and-Whisker Plots**

Create multiple box-and-whisker plots on your graphing calculator. Compare and contrast the distributions based on these plots.

Duration: 1 hr 30 mins Scoring: 25 points

### **Discuss: Five-Number Summaries on MINITAB**

Discuss distributions illuminated by related box-and-whisker plots and their MINITAB output. Learn how to read MINITAB output for five-number summaries and box-and-whisker plots.

## LESSON 5: MORE ON DESCRIBING DISTRIBUTIONS

### Practice: Averages in Skewed Data

Graph skewed data on the TI-83 and calculate the mean and median. Repeat with a skewed left distribution.

Duration: 0 hrs 30 mins

### Quiz: Estimating Distribution Shape, Using Measures of Central Tendency

Answer questions about how a sample can be used to estimate the shape of the distribution. See how to decide which measures of central tendency and variation are most appropriate to use with differently shaped distributions.

Duration: 1 hr Scoring: 10 points

### Practice: Changes in Units of Measurement

Explore changes in measures of center and spread resulting from changes in unit (using conversions between Celsius and Fahrenheit).

Duration: 0 hrs 30 mins

### Practice: Distributions of Data

Bring together terms and symbols for characterizing a distribution, write about characteristics of different distributions in these terms, and offer theories about why the distributions are shaped as they are.

Duration: 2 hrs Scoring: 25 points

### Quiz: Important Concepts From This Unit

Answer questions to clarify your knowledge of some important concepts in statistics.

Duration: 1 hr Scoring: 15 points

## LESSON 6: WRAP-UP

### Discuss: What Is Interesting? What Is Confusing?

Discuss basic statistics, graphs, five-number summaries, distributions, and any concepts about which you are unclear.

Duration: 0 hrs 30 mins Scoring: 10 points

### Review: Describing Data

Review your studies of basic statistics, graphs, five-number summaries, and distributions.

Duration: 3 hrs 30 mins

### Test (CS): Describing Data

Take a test about the basics of statistics.

Duration: 0 hrs 20 mins Scoring: 48 points

### Test (TS): Describing Data

Take a test about the basics of statistics.

Duration: 0 hrs 30 mins Scoring: 52 points

## UNIT 2: THE NORMAL DISTRIBUTION

### LESSON 1: INTRODUCTION TO THE NORMAL DISTRIBUTION

#### Discuss: Performance Comparisons

Discuss performance comparisons between two unrelated distributions, such as scoring averages in baseball and basketball. Show distributions for scoring averages in two sports.

Duration: 0 hrs 30 mins Scoring: 10 points

#### Study: The Normal Curve

Explore the characteristics and uses of one of the most important distributions in statistics: the bell-shaped (or normal) distribution.

Duration: 0 hrs 50 mins

#### Practice: The Normal Curve

Answer questions about the characteristics and uses of one of the most important distributions in statistics: the bell-shaped (or normal) distribution.

Duration: 0 hrs 30 mins

### **Practice: Properties of Normal Distributions**

Manipulate graphs of normal curves and explore their properties. Change means and standard deviations to see the effect on the shape of the curve. Think of areas under the curve as proportions, relative frequencies, and probabilities.

Duration: 1 hr

### **Practice: RandNorm() on a Graphing Calculator**

Use the RandNorm function on a graphing calculator to draw a sample. Store the data in a list, then create a histogram from the data and discuss whether the data appears "normal."

Duration: 0 hrs 30 mins

## **LESSON 2: STANDARDIZED SCORES**

### **Study: Raw and Standardized Scores**

Explore the standard normal distribution. See how to find areas in a normal distribution and in a standard normal distribution.

Duration: 0 hrs 50 mins

### **Practice: Raw and Standardized Scores**

Answer questions about the standard normal distribution. See how to find areas in a normal distribution and in a standard normal distribution.

Duration: 0 hrs 30 mins

### **Practice: x-Values and z-Scores**

Manipulate graphs of normal curves to find areas, proportions, and probabilities.

Duration: 1 hr

### **Practice: Using a Normal Curve Table**

Translate raw scores to percentiles and areas (and vice versa) using a normal distribution table.

Duration: 0 hrs 50 mins

### **Quiz: x-Values, z-Scores, and Areas on the Calculator**

Answer questions that require you to convert normal distribution scores using your graphing calculator.

Duration: 0 hrs 50 mins Scoring: 10 points

## **LESSON 3: DETERMINING IF A DATA SET IS NORMAL**

### **Study: Checking a Data Set for Normalcy**

See how to check for normalcy using either the empirical rule or a normal quantile plot. Also, see how to use a graphing calculator to make a quantile plot.

Duration: 0 hrs 50 mins

### **Practice: Checking a Data Set for Normalcy**

Answer questions about how to check for normalcy using either the empirical rule or a normal quantile plot. Also, see how to use a graphing calculator to make a quantile plot.

Duration: 0 hrs 30 mins

### **Quiz: Empirical Rule and Quantile Plots**

Answer questions about testing a data set for normalcy using the empirical rule and normal quantile plots.

Duration: 1 hr Scoring: 15 points

### **Practice: Checking for Normalcy**

Use the empirical rule to determine if a given data set is normal. Use a graphing calculator to do a normal quantile plot, and decide if it is close to a normal distribution.

Duration: 1 hr Scoring: 25 points

### **Quiz: Aspects of the Normal Distribution**

Answer questions about terms and properties associated with the normal distribution.

Duration: 0 hrs 50 mins Scoring: 20 points

## LESSON 4: WRAP-UP

### Discuss: What Is Interesting? What Is Confusing?

Discuss the normal distribution, and any concepts about which you are unclear.

Duration: 0 hrs 30 mins Scoring: 10 points

### Review: The Normal Distribution

Review your studies of the normal distribution.

Duration: 3 hrs 30 mins

### Test (CS): The Normal Distribution

Take a test about the normal distribution.

Duration: 0 hrs 20 mins Scoring: 48 points

### Test (TS): The Normal Distribution

Take a test about the normal distribution.

Duration: 0 hrs 30 mins Scoring: 52 points

## UNIT 3: BIVARIATE DATA

### LESSON 1: INTRODUCTION TO BIVARIATE DATA

#### Discuss: Shoe Size vs. Height

Using data provided, plot shoe size and height to see if there's a pattern. Discuss your findings.

Duration: 0 hrs 30 mins Scoring: 10 points

#### Practice: Scatterplots and Bivariate Data

Go over the distinction between categorical and quantitative variables. Create scatterplots and explore the distinction between the explanatory variable and the response variable.

Duration: 0 hrs 30 mins

### LESSON 2: THE LEAST-SQUARES REGRESSION LINE

#### Study: Least-Squares Regression Line

Explore the least-squares regression line (a model for data that may be linearly associated).

Duration: 0 hrs 50 mins

#### Practice: Least-Squares Regression Line

Answer questions about the least-squares regression line (a model for data that may be linearly associated).

Duration: 0 hrs 30 mins

#### Practice: Exploring LSR With a Graphing Calculator

Use a graphing calculator to explore the meaning of the least-squares regression and find lines of best fit. Learn about residuals and how to calculate them on your graphing calculator.

Duration: 0 hrs 50 mins

#### Study: Residuals

Explore residuals in linear regression and see how to compute them with a graphing calculator.

Duration: 0 hrs 50 mins

#### Practice: Residuals

Answer questions about residuals in linear regression and see how to compute them with a graphing calculator.

Duration: 0 hrs 30 mins

#### Practice: Linear Regression Lines

Given bivariate data, produce a scatterplot and produce a linear regression line and its residual plot by using a graphing calculator. Explain why a line is or is not a good model for the given data.

### LESSON 3: THE CORRELATION COEFFICIENT

#### Study: Pearson: Correlation Coefficient

Explore Pearson's correlation coefficient. See what scatterplots look like for various  $r$ 's, and see how to obtain  $r$  on a graphing calculator. Examine the relationship between  $r$  and the slope of the regression line.

Duration: 0 hrs 50 mins

#### Practice: Pearson: Correlation Coefficient

Answer questions about Pearson's correlation coefficient. See what scatterplots look like for various  $r$ 's, and see how to obtain  $r$  on a graphing calculator. Examine the relationship between  $r$  and the slope of the regression line.

Duration: 0 hrs 30 mins

#### Discuss: Exploring Correlation Coefficient: $r$

Use your graphing calculator to explore correlation coefficients for different distributions. Move, create, and delete points to see the effects on Pearson's  $r$ . Discuss your findings.

Duration: 0 hrs 30 mins Scoring: 10 points

#### Practice: $r$ on Your Graphing Calculator

Given some bivariate real-world data, use your graphing calculator's STAT functions to find the linear regression line and the correlation coefficient  $r$ .

Duration: 0 hrs 30 mins

#### Study: The Meaning of $r$ -Squared

Explore  $r$ -squared (also called the coefficient of determination), which gives the proportion of the variation in a response variable that is explained by the explanatory variable.

Duration: 0 hrs 50 mins

#### Practice: The Meaning of $r$ -Squared

Answer questions about  $r$ -squared (also called the coefficient of determination), which gives the proportion of the variation in a response variable that is explained by the explanatory variable.

Duration: 0 hrs 30 mins

#### Practice: Finding and Interpreting $r$ and $r$ -Squared

Given some real-world bivariate data, use your graphing calculator's STAT functions to find the linear regression line,  $r$ , and  $r$ -squared. Explain the meaning of  $r$ ,  $r$ -squared, and the slope of the regression line in the context of each problem.

Duration: 1 hr

#### Study: Uses of the Regression Line

Explore correlation, residual plots, and linear regression predictions. Examine the distinction between interpolation and extrapolation.

Duration: 0 hrs 50 mins

#### Practice: Uses of the Regression Line

Answer questions about correlation, residual plots, and linear regression predictions. Examine the distinction between interpolation and extrapolation.

Duration: 0 hrs 30 mins

#### Practice: Relation of Shoe Size to Height

Determine whether the correlation is strong for a data set. Calculate the  $r$  and find the linear regression line—. Determine whether there is evidence that the variables are related.

Duration: 0 hrs 30 mins

#### Practice: Regression Lines and Bivariate Statistics

Given real-world bivariate data, use your graphing calculator's STAT functions to find the linear regression line and its slope. Explain and interpret the meaning of the slope (the regression coefficient). Explain the meaning of  $r$  and  $r$ -squared.

Duration: 2 hrs Scoring: 25 points

**Study: How to Read MINITAB Output**

See how to read MINITAB output for scatterplots, linear regression lines, correlation coefficients and  $r$ -squared, residual plots, and other bivariate statistics.

Duration: 0 hrs 50 mins

**Practice: How to Read MINITAB Output**

Answer questions about how to read MINITAB output for scatterplots, linear regression lines, correlation coefficients and  $r$ -squared, residual plots, and other bivariate statistics.

Duration: 0 hrs 30 mins

**Discuss: Correlation vs. Causation**

Consider bivariate data sets (along with stories about how the data sets were gathered) and discuss whether the data sets may or may not show a cause-and-effect relationship.

Duration: 0 hrs 30 mins Scoring: 10 points

**LESSON 4: INFLUENTIAL POINTS AND OUTLIERS****Study: Influential Points and Outliers**

Explore the effects of outliers and influential points on a linear regression.

Duration: 0 hrs 50 mins

**Practice: Influential Points and Outliers**

Answer questions about the effects of outliers and influential points on a linear regression.

Duration: 0 hrs 30 mins

**Practice: Bivariate Statistics and Outliers**

Use your graphing calculator to explore the effects of outliers on the least-squares line regression and on the correlation coefficient. Then use your graphing calculator to explore a set of bivariate data.

Duration: 1 hr

**Quiz: Aspects of Linear Regression**

Answer questions about scatterplots, variables, linear regression, residuals,  $r$ ,  $r$ -squared, outliers, influential points, interpolation, and extrapolation.

Duration: 0 hrs 50 mins Scoring: 15 points

**LESSON 5: TRANSFORMATIONS TO ACHIEVE LINEARITY****Study: Transformations to Achieve Linearity**

Explore data sets that are not linearly associated, and see how to transform the data in such sets to achieve linear association.

Duration: 0 hrs 50 mins

**Practice: Transformations to Achieve Linearity**

Answer questions about data sets that are not linearly associated, and see how to transform the data in such sets to achieve linear association.

Duration: 0 hrs 30 mins

**Practice: Transformations to Achieve Linearity**

Use the graphing calculator's STAT functions to practice the methods to straighten exponential, power, and logarithmic associations.

Duration: 1 hr 30 mins Scoring: 25 points

**Practice: Straightening Relationships**

Practice regression techniques.

Duration: 1 hr

**LESSON 6: CATEGORICAL BIVARIATE DATA: TWO-WAY TABLES****Discuss: Comparing Groups in a Table**



Discuss questions such as the following: Does a sports team perform better at home or away? Is there a relationship between education and military service?

Duration: 0 hrs 30 mins Scoring: 10 points

### **Study: How to Interpret a Two-Way Table**

Examine marginal frequencies, row and column percents, and conditional distributions.

Duration: 0 hrs 50 mins

### **Practice: How to Interpret a Two-Way Table**

Answer questions about marginal frequencies, row and column percents, and conditional distributions.

Duration: 0 hrs 30 mins

### **Practice: Creating Two-Way Tables**

Use a data set to create a two-way table with row and column percents. Create joint frequencies and marginal frequencies and answer questions about the conclusions you can draw.

Duration: 1 hr

### **Discuss: A Paradox**

Discuss how strange things can happen when data or statistics are combined.

Duration: 0 hrs 30 mins Scoring: 10 points

### **Quiz: Simpson: Paradox and Confounding**

Answer questions about Simpson's paradox.

Duration: 0 hrs 50 mins Scoring: 10 points

## **LESSON 7: WRAP-UP**

### **Discuss: What Is Interesting? What Is Confusing?**

Discuss bivariate data, the least-squares regression line, the correlation coefficient, influential points and outliers, categorical bivariate data, two-way tables, and any concepts about which you are unclear.

Duration: 0 hrs 30 mins Scoring: 10 points

### **Review: Bivariate Data: Regression Analysis and Two-Way Tables**

Review your studies of bivariate data.

Duration: 3 hrs 30 mins

### **Test (CS): Bivariate Data**

Take a test about bivariate data.

Duration: 0 hrs 20 mins Scoring: 48 points

### **Test (TS): Bivariate Data**

Take a test about bivariate data.

Duration: 0 hrs 30 mins Scoring: 52 points

## **UNIT 4: PLANNING A STUDY**

### **LESSON 1: METHODS OF DATA COLLECTION--EXPERIMENTS AND STUDIES**

#### **Study: Vocabulary of Data Collection**

Explore data-collection terms and concepts such as sample, census, anecdotal evidence, available data, design for producing data, and observational study vs. experiment.

Duration: 0 hrs 50 mins

#### **Practice: Vocabulary of Data Collection**

Explore data-collection terms and concepts such as sample, census, anecdotal evidence, available data, design for producing data, and observational study vs. experiment.

Duration: 0 hrs 30 mins

#### **Quiz: Data Collection**

Answer questions about methods of data collection and state whether they will yield valid results. Differentiate between an observational study and an experiment.

Duration: 1 hr Scoring: 10 points

### **Study: Vocabulary of Experiments and Surveys**

Explore experiment terminology and the three principles of experimental design.

Duration: 0 hrs 50 mins

### **Practice: Vocabulary of Experiments and Surveys**

Explore experiment terminology and the three principles of experimental design.

Duration: 0 hrs 30 mins

### **Practice: Aspects of Experiments**

Given an experimental design, identify terms associated with experiments. Identify elements of effective and flawed design.

Duration: 0 hrs 50 mins

### **Quiz: Designs for Experiments**

Answer questions about completely randomized design vs. randomized match-paired design vs. randomized block design.

Duration: 1 hr 30 mins Scoring: 10 points

### **Practice: Choosing the Design of an Experiment**

Design an experiment to test a given researchable issue.

Duration: 1 hr 30 mins Scoring: 25 points

## **LESSON 2: METHODS OF DATA COLLECTION--SURVEYS**

### **Study: Types of Samples for Surveys**

Explore the types of samples for surveys, including: simple random sample, census, stratified random sample, convenience sample, systematic sample and cluster sample, representative sample as opposed to a random sample, and self-selected sample.

Duration: 0 hrs 50 mins

### **Practice: Types of Samples for Surveys**

Explore the types of samples for surveys, including: simple random sample, census, stratified random sample, convenience sample, systematic sample and cluster sample, representative sample as opposed to a random sample, and self-selected sample.

Duration: 0 hrs 30 mins

### **Practice: Generating Random Samples**

Using the random number generator on a graphing calculator, randomly allocate subjects to two or more groups, so that the groups have equal size or their placement is independent.

Duration: 0 hrs 50 mins

### **Study: Bias in Surveys/Transition to Inference**

Explore the types of bias in surveys, including the following: under-coverage, non-response, response bias, voluntary response, wording of a question, order of questions, and sampling bias.

Duration: 1 hr

### **Practice: Bias in Surveys/Transition to Inference**

Explore the types of bias in surveys, including the following: under-coverage, non-response, response bias, voluntary response, wording of a question, order of questions, and sampling bias.

Duration: 0 hrs 30 mins

### **Quiz: Factors Causing Bias**

Answer questions about the various causes of bias in observational studies and experiments.

Duration: 1 hr Scoring: 10 points

### **Quiz: Aspects of Studies**

Answer questions about terms related to experimental and observational studies.

Duration: 1 hr Scoring: 10 points

### LESSON 3: WRAP-UP

#### **Discuss: What Is Interesting? What Is Confusing?**

Discuss methods of data collection, including experiments, studies, and surveys, and any concepts about which you are unclear.

Duration: 0 hrs 30 mins Scoring: 10 points

#### **Review: Planning a Study**

Review your studies of methods of data collection.

Duration: 3 hrs 30 mins

#### **Test (CS): Planning a Study**

Take a test about methods of data collection.

Duration: 0 hrs 20 mins Scoring: 48 points

#### **Test (TS): Planning a Study**

Take a test about methods of data collection.

Duration: 0 hrs 30 mins Scoring: 52 points

## UNIT 5: PROBABILITY

### LESSON 1: WHAT IS PROBABILITY?

#### **Study: Range of Probabilities**

See that the range of probabilities is between 0 and 1, and that probabilities can be estimated from past events, from the theoretical definition of probability (equally likely outcomes), or from an intuition based on previous experience.

Duration: 0 hrs 50 mins

#### **Practice: Range of Probabilities**

See that the range of probabilities is between 0 and 1, and that probabilities can be estimated from past events, from the theoretical definition of probability (equally likely outcomes), or from an intuition based on previous experience.

Duration: 0 hrs 30 mins

#### **Discuss: What Do You Mean by That?**

Discuss which words denote what probabilities. Associate words like *might*, *maybe*, *certain*, *probably*, *possibly*, *unlikely*, and *very likely* with a single probability or a range of probabilities from 0 to 1.

Duration: 0 hrs 30 mins Scoring: 10 points

#### **Practice: What Is Probability?**

Consider probability in terms of relative frequencies. Look at examples and answer questions.

Duration: 0 hrs 30 mins

#### **Quiz: Calculating Probabilities**

Answer questions that require you to calculate probabilities from a given data set.

Duration: 0 hrs 50 mins Scoring: 10 points

### LESSON 2: INTRODUCTION TO THE BASIC RULES OF PROBABILITY

#### **Study: Concepts of Probability**

Explore basic concepts of probability, such as sample space, outcome, and event.

Duration: 0 hrs 50 mins

#### **Practice: Concepts of Probability**

Explore basic concepts of probability, such as sample space, outcome, and event.

Duration: 0 hrs 30 mins

#### **Quiz: Basic Concepts of Probability**

Answer questions about the basic concepts of probability.

Duration: 1 hr Scoring: 10 points

**Study: The Rules of Probability and an Introduction to Conditional Probability**

Explore conditional probability, and learn some rules for solving probability problems.

Duration: 0 hrs 50 mins

**Practice: The Rules of Probability and an Introduction to Conditional Probability**

Explore conditional probability, and learn some rules for solving probability problems.

Duration: 0 hrs 30 mins

**Practice: Using the Rules of Probability**

Apply the rules for calculating conditional probabilities and the probabilities of combined events.

Duration: 1 hr 30 mins Scoring: 25 points

**LESSON 3: MORE ON CONDITIONAL PROBABILITIES AND THE PROBABILITIES OF COMBINED EVENTS**

**Practice: Practice With Laws of Probability**

Apply probability laws.

Duration: 1 hr

**Study: Conditional Probabilities and Tree Diagrams**

Explore conditional and combined probability using tree diagrams and two-way tables.

Duration: 0 hrs 50 mins

**Practice: Conditional Probabilities and Tree Diagrams**

Explore conditional and combined probability using tree diagrams and two-way tables.

Duration: 0 hrs 30 mins

**Practice: Tree Diagrams and Probabilities**

Use tree diagrams to find probabilities.

Duration: 1 hr

**Quiz: Calculating Conditional Probabilities Graphically**

Answer questions about conditional probability using tree-diagrams or two-way tables.

Duration: 1 hr Scoring: 10 points

**LESSON 4: PROBABILITY DISTRIBUTIONS**

**Study: Random Variables: Discrete and Continuous**

Explore random variables. Consider discrete vs. continuous random variables, and see how they're used in probability. Examine probability distributions for random variables, density curves, and see why  $P(x) = 0$  for any individual number.

Duration: 0 hrs 50 mins

**Practice: Random Variables: Discrete and Continuous**

Explore random variables. Consider discrete vs. continuous random variables, and see how they're used in probability. Examine probability distributions for random variables, density curves, and see why  $P(x) = 0$  for any individual number.

Duration: 0 hrs 30 mins

**Practice: Discrete Probability Distributions**

Use your graphing calculator to do virtual random experiments (such as die rolls, coin flips, and candy samples) and see their histograms. Convert probability tables into histograms and vice versa. Create probability histograms from given facts.

Duration: 1 hr

**Quiz: Aspects of Random Variables**

Answer questions about discrete random variables, continuous random variables, density curves, probability distributions, and probability histograms.

Duration: 0 hrs 50 mins Scoring: 15 points

**LESSON 5: MEANS AND VARIANCES OF RANDOM VARIABLES**

**Discuss: Dice Games**

Given the rules of various dice games, rank them by which you'd prefer to play (from a statistical point of view). Discuss your ranking.

Duration: 0 hrs 30 mins Scoring: 10 points

**Study: Mean and Variances of Random Variables**

Go over expected value or expectation. Examine the rules for means and the effect of an  $a + bx$  transformation. Look at the rules for variances (and standard deviations).

Duration: 0 hrs 50 mins

**Practice: Mean and Variances of Random Variables**

Go over expected value or expectation. Examine the rules for means and the effect of an  $a + bx$  transformation. Look at the rules for variances (and standard deviations).

Duration: 0 hrs 30 mins

**Practice: Computing Means and Variances**

Apply your knowledge of how to compute means and variances.

Duration: 1 hr Scoring: 25 points

**Quiz: Games and Real-World Problems**

Answer questions that require you to apply probability rules to problems and games.

Duration: 0 hrs 50 mins Scoring: 10 points

**LESSON 6: SEMESTER WRAP-UP****Discuss: What Is Interesting? What Is Confusing?**

Discuss probability, including conditional probabilities, probabilities of combined events, probability distributions, and means and variances of random variables, and any concepts about which you are unsure.

Duration: 0 hrs 30 mins Scoring: 10 points

**Review: Probability Review**

Review your studies of probability.

Duration: 3 hrs 30 mins

**Review: Semester 1 Review**

Review your studies of basic statistics.

Duration: 4 hrs

**Exam: Semester Exam**

Take a test about basic statistics.

Duration: 0 hrs 55 mins Scoring: 100 points

**Final Exam: Semester Exam**

Take a test about basic statistics.

Duration: 0 hrs 55 mins Scoring: 100 points

**UNIT 6: BINOMIALS AND DISTRIBUTIONS****LESSON 1: INTRODUCTION TO INFERENCE STATISTICS****Study: Introduction to Inferential Statistics**

Explore an overview of intervals, significance, inference and various applications.

Duration: 0 hrs 50 mins

**Practice: Introduction to Inferential Statistics**

Explore an overview of intervals, significance, inference and various applications.

Duration: 0 hrs 30 mins

**Discuss: Uses of Inferential Statistics**

Discuss how and where you've seen inferential statistics used.

Duration: 0 hrs 30 mins Scoring: 10 points

## LESSON 2: BINOMIAL DISTRIBUTIONS

### Study: Binomial Situations (Events)

Consider the definition of a binomial setting, and use the binomial calculations to solve problems. Examine binomial settings involving *at least*, *at most*, and *between*. Explore your graphing calculator to do binomial problems.

Duration: 0 hrs 50 mins

### Practice: Binomial Situations (Events)

Consider the definition of a binomial setting, and use the binomial calculations to solve problems. Examine binomial settings involving *at least*, *at most*, and *between*. Explore your graphing calculator to do binomial problems.

Duration: 0 hrs 30 mins

### Quiz: Binomial Settings and Binomial Probabilities

Solve binomial problems with and without a graphing calculator.

Duration: 1 hr Scoring: 10 points

### Study: The Normal Approximation to the Binomial

Consider the normal approximation to the binomial distribution. Explore the cumbersome nature of calculating binomial probabilities exactly. Look at continuity correction.

Duration: 0 hrs 50 mins

### Practice: The Normal Approximation to the Binomial

Consider the normal approximation to the binomial distribution. Explore the cumbersome nature of calculating binomial probabilities exactly. Look at continuity correction.

Duration: 0 hrs 30 mins

### Quiz: Binomial Problems

Work on binomial problems and consider the criteria for using the normal approximation. Compare answers obtained with the normal approximation to the binomial to those obtained with the exact binomial.

Duration: 1 hr Scoring: 10 points

### Practice: Binomial Problems Using Two Methods

Work on binomial, individual, and interval problems using both the normal approximation to the binomial and, on the graphing calculator, the exact binomial.

Duration: 1 hr Scoring: 25 points

## LESSON 3: GEOMETRIC DISTRIBUTION

### Discuss: When Are You Most Likely to Get Your First Red Candy?

Discuss average waiting-time problems.

Duration: 0 hrs 30 mins Scoring: 10 points

### Study: Geometric Probability Distributions

Look at geometric distributions. These are skewed distributions modeling the probability of getting doubles before a certain roll of dice, or the average waiting-time to get a certain answer to a polling question.

Duration: 0 hrs 50 mins

### Practice: Geometric Probability Distributions

Look at geometric distributions. These are skewed distributions modeling the probability of getting doubles before a certain roll of dice, or the average waiting-time to get a certain answer to a polling question.

Duration: 0 hrs 30 mins

### Quiz: Geometric Distribution Problems

Consider geometric distribution problems with and without your graphing calculator.

Duration: 1 hr Scoring: 10 points

## LESSON 4: SAMPLING DISTRIBUTIONS: MEANS AND PROPORTIONS

### Discuss: Which Is More Likely?

Consider the question, "Which is more likely, that the next person you see will be taller than 6' 6" or that the next five people you see will have an average height above 6' 6"?"

Duration: 0 hrs 30 mins Scoring: 10 points

### Study: Sampling Distributions and the Central Limit Theorem

Go over sampling distributions and the sampling distribution of a sample mean. Study the mean and standard deviation of the sampling distribution of the mean. Explore the Central Limit Theorem.

Duration: 0 hrs 50 mins

### Practice: Sampling Distributions and the Central Limit Theorem

Go over sampling distributions and the sampling distribution of a sample mean. Study the mean and standard deviation of the sampling distribution of the mean. Explore the Central Limit Theorem.

Duration: 0 hrs 30 mins

### Practice: Sampling Distributions

Practice using the Central Limit Theorem to predict the means, standard deviations, and shapes of sampling distributions.

Duration: 1 hr

### Practice: Sampling Distributions

Use your graphing calculator to create sampling distributions. Calculate their means and standard deviations.

Duration: 1 hr Scoring: 25 points

### Study: Sample Proportions

Look at the derivation of the mean and standard deviation of a sample proportion, based on the binomial.

Duration: 0 hrs 50 mins

### Practice: Sample Proportions

Look at the derivation of the mean and standard deviation of a sample proportion, based on the binomial.

Duration: 0 hrs 30 mins

### Practice: Sampling Distribution of $\hat{p}$

Work on problems based on the mean and standard deviation of a sampling distribution of  $\hat{p}$ . Get additional practice dealing with the sampling distribution of means.

Duration: 1 hr Scoring: 25 points

### Quiz: Important Concepts From This Unit

Review the concepts of sampling distribution, the Central Limit Theorem, and sampling distributions for the sample mean and  $\hat{p}$ .

Duration: 1 hr Scoring: 10 points

## LESSON 5: UNIT WRAP-UP

### Discuss: What Is Interesting? What Is Confusing?

Discuss concepts you find interesting or confusing in an informal setting.

Duration: 0 hrs 30 mins Scoring: 10 points

### Review: Binomial Situations and Sampling Distributions

Review your studies of binomial situations and sampling distributions.

Duration: 3 hrs 30 mins

### Test (CS): Binomial Situations and Sampling Distributions

Take a 20-minute test covering inferential statistics, binomial distributions, geometric distribution, and means and proportions.

Duration: 0 hrs 20 mins Scoring: 48 points

### Test (TS): Binomial Situations and Sampling Distributions

Take a 30-minute test covering inferential statistics, binomial distributions, geometric distribution, and means and proportions.

## UNIT 7: INTRODUCTION TO INFERENCE

### LESSON 1: CONFIDENCE INTERVALS FOR MEANS

#### Discuss: Guessing an Estimate

Discuss how comfortable you are with guessing numbers within certain intervals. As the intervals widen, does your comfort level increase?

Duration: 0 hrs 30 mins Scoring: 10 points

#### Study: Using Sample Means to Estimate Population Means

Consider how to estimate the mean of a population using a sample. Examine confidence intervals and the general form of a confidence interval. Find critical  $z$ -values for various confidence levels by using tables and the graphing calculator's InvNorm function.

Duration: 0 hrs 50 mins

#### Practice: Using Sample Means to Estimate Population Means

Consider how to estimate the mean of a population using a sample. Examine confidence intervals and the general form of a confidence interval. Find critical  $z$ -values for various confidence levels by using tables and the graphing calculator's InvNorm function.

Duration: 0 hrs 30 mins

#### Quiz: Confidence Intervals

Estimate population means, creating 95% and 99% confidence  $z$ -intervals for means. Find critical  $z$ -values for non-standard confidence levels.

Duration: 1 hr Scoring: 10 points

#### Practice: Confidence Intervals

Build an understanding of the term *statistical confidence*.

Duration: 1 hr

#### Quiz: Finding Desired Sample Sizes

Look at how to find the desired sample size to create a  $z$ -interval with a given margin of error and confidence level. Consider the relationship between sample size, confidence level, and margin of error.

Duration: 1 hr Scoring: 10 points

#### Practice: Creating Intervals

Create intervals for means using the formula and the graphing calculator's STAT TESTS function. Calculate the sample size  $n$  necessary to produce a given margin of error and a certain confidence level.

Duration: 1 hr Scoring: 25 points

### LESSON 2: STATISTICAL SIGNIFICANCE AND P-VALUE

#### Discuss: How Good Is the Guess?

Discuss the following scenario: A psychic says she knows what time of day you were born. She tells you her guess and she's right! How would you quantify how good her guess is?

Duration: 0 hrs 30 mins Scoring: 10 points

#### Study: The Definition of P-Value

Explore the concepts of *statistical significance* and *significance levels*. Consider what it means to say that a finding is different enough from what was expected that we can reject it as chance variation.

Duration: 0 hrs 50 mins

#### Practice: The Definition of P-Value

Explore the concepts of *statistical significance* and *significance levels*. Consider what it means to say that a finding is different enough from what was expected that we can reject it as chance variation.

Duration: 0 hrs 30 mins



### Quiz: Working With P-Values and Statistical Significance

Find  $P$ -values for different distributions. Determine statistical significance.

Duration: 1 hr Scoring: 10 points

## LESSON 3: SIGNIFICANCE AND HYPOTHESIS TESTING: MEANS

### Discuss: What Is an Impressive Prediction?

Look at cases where people make successful predictions. How do you know whether the successful prediction was just luck?

Duration: 0 hrs 30 mins Scoring: 10 points

### Study: The Hypothesis-Testing Procedure

Look at the hypothesis-testing procedure and null and alternative hypotheses. Consider one- and two-sided hypotheses, and how to compute a  $P$ -value.

Duration: 0 hrs 50 mins

### Practice: The Hypothesis-Testing Procedure

Look at the hypothesis-testing procedure and null and alternative hypotheses. Consider one- and two-sided hypotheses, and how to compute a  $P$ -value.

Duration: 0 hrs 30 mins

### Practice: Hypothesis Tests for Means

Perform hypothesis tests for means and then support the conclusion.

Duration: 1 hr

### Practice: More Hypothesis Tests for Means

Apply your knowledge of significance and hypothesis testing to answer the questions in this Assignment.

Duration: 1 hr Scoring: 25 points

### Study: Two-Sided Significance Tests and Confidence Intervals

Consider the relationship between two-tailed significance tests and confidence intervals. See examples of how a confidence interval for means can solve a two-tailed significance test for means.

Duration: 0 hrs 50 mins

### Practice: Two-Sided Significance Tests and Confidence Intervals

Consider the relationship between two-tailed significance tests and confidence intervals. See examples of how a confidence interval for means can solve a two-tailed significance test for means.

Duration: 0 hrs 30 mins

### Quiz: Two-Sided Significance Tests and Confidence Intervals

Work on parallel problems: a confidence interval and its corresponding significance test. Observe that the same conclusions are reached with each method.

Duration: 1 hr Scoring: 10 points

## LESSON 4: ERRORS IN HYPOTHESIS TESTING

### Discuss: Innocent or Guilty?

Discuss the following scenario: A person is on trial. If your hypothesis is that the person is innocent, what kinds of errors can you make if you declare the person guilty or innocent?

Duration: 0 hrs 30 mins Scoring: 10 points

### Study: The Power of the Test, Type I and Type II Errors

Look at two types of errors in hypothesis testing. Consider several concepts, including the power of a test, the relationship between significance level and a Type I error, and the relationship between power and a Type II error.

Duration: 0 hrs 50 mins

### Practice: The Power of the Test, Type I and Type II Errors

Look at two types of errors in hypothesis testing. Consider several concepts, including the power of a test, the relationship between significance level and a Type I error, and the relationship between power and a Type II error.

Duration: 0 hrs 30 mins

### Practice: Dangers of Type I and Type II Errors

Look at various situations and determine the dangers inherent in making Type I and Type II errors.

Duration: 1 hr

### Practice: Computing Probabilities for Type I and Type II Errors

Look at hypothesis-testing situations and compute the probabilities of Type I errors, Type II errors, and the power of the test. Emphasis is on the concepts of errors and power rather than on computation, although some computation will be done.

Duration: 1 hr Scoring: 25 points

### Quiz: Concepts of Hypothesis and Significance Testing

Test of your understanding of concepts such as point estimate,  $P$ -value, null hypothesis, alternative hypothesis, statistical significance, result, conclusion, one-tailed, two-tailed, Type I and Type II errors.

Duration: 1 hr Scoring: 10 points

## LESSON 5: UNIT WRAP-UP

### Discuss: What Is Interesting? What Is Confusing?

Discuss concepts you find interesting or confusing in an informal setting.

Duration: 0 hrs 30 mins Scoring: 10 points

### Review: Introduction to Inference: Confidence Intervals and Hypothesis Testing

Review your studies of confidence intervals and hypothesis testing.

Duration: 3 hrs 30 mins

### Test (CS): Introduction to Inference

Take a 20-minute test covering confidence intervals for means, statistical significance and  $P$ -value, means, and errors in hypothesis testing.

Duration: 0 hrs 20 mins Scoring: 48 points

### Test (TS): Introduction to Inference

Take a 30-minute test covering confidence intervals for means, statistical significance and  $P$ -value, means, and errors in hypothesis testing.

Duration: 0 hrs 30 mins Scoring: 52 points

## UNIT 8: T DISTRIBUTION FOR MEANS

### LESSON 1: CONFIDENCE INTERVALS AND HYPOTHESIS TESTING FOR A SINGLE MEAN

#### Study: The $t$ Distributions

Examine what to do when you don't know the population standard deviation. Look at the important assumptions necessary to use the  $t$  distribution and notice how to use the  $t$  tables and a graphing calculator for the  $t$  distribution.

Duration: 0 hrs 50 mins

#### Practice: The $t$ Distributions

Examine what to do when you don't know the population standard deviation. Look at the important assumptions necessary to use the  $t$  distribution and notice how to use the  $t$  tables and a graphing calculator for the  $t$  distribution.

Duration: 0 hrs 30 mins

#### Practice: Creating Confidence Intervals

Create 90%, 95%, and 99% confidence  $t$  intervals for means. Practice doing this using your graphing calculator.

Duration: 1 hr

#### Quiz: Concepts Relating to Confidence $t$ Intervals

Create  $t$  intervals for means using the formula and the graphing calculator's STAT TESTS function. Calculate the sample size  $n$  needed to produce a given margin of error and a certain confidence level.

Duration: 1 hr Scoring: 10 points

**Practice: Hypothesis Testing With the  $t$  Distribution**

Follow the steps for conducting hypothesis tests (both one- and two-sided) using the  $t$  distribution. Consider the relationship between confidence intervals and significance tests. Look at power and Type I and Type II errors.

Duration: 1 hr

**Practice:  $t$  Intervals and Hypothesis Tests**

Apply the calculations for  $t$  intervals and hypothesis tests from start to finish using realistic data sets. Justify use of the  $t$  procedures.

Duration: 1 hr Scoring: 25 points

**LESSON 2: CONFIDENCE INTERVALS FOR THE DIFFERENCE BETWEEN TWO MEANS****Study: Inference for Matched-Pairs Situations**

Look at when data should and should not be analyzed as a matched-pairs situation. Explore the hypothesis-testing procedures and  $t$  intervals for matched-pairs data.

Duration: 0 hrs 50 mins

**Practice: Inference for Matched-Pairs Situations**

Look at when data should and should not be analyzed as a matched-pairs situation. Explore the hypothesis-testing procedures and  $t$  intervals for matched-pairs data.

Duration: 0 hrs 30 mins

**Quiz: Matched Pairs or Not?**

Identify situations in which it's appropriate to use matched-pairs analysis.

Duration: 1 hr Scoring: 10 points

**Practice:  $t$  Intervals and Hypothesis Tests With Matched Pairs Data**

Look at how to use your graphing calculator's LISTS and STAT TESTS to create confidence intervals and to conduct hypothesis tests for paired data.

Duration: 1 hr

**Quiz: Matched Pairs Confidence Intervals and  $t$  Tests**

Solve problems using matched-pairs  $t$  tests.

Duration: 1 hr Scoring: 10 points

**LESSON 3: CONFIDENCE INTERVALS AND HYPOTHESIS TESTS FOR TWO INDEPENDENT SAMPLES****Study:  $t$  Intervals for Two Independent Samples**

Use  $t$  intervals for two independent samples, and compute degrees of freedom using the conservative method, the software method, and pooled variances.

Duration: 0 hrs 50 mins

**Practice:  $t$  Intervals for Two Independent Samples**

Use  $t$  intervals for two independent samples, and compute degrees of freedom using the conservative method, the software method, and pooled variances.

Duration: 0 hrs 30 mins

**Quiz:  $t$  Intervals for Two Independent Samples**

Compute and interpret  $t$  intervals for two independent samples.

Duration: 1 hr Scoring: 10 points

**Practice:  $t$  Intervals for Two Independent Samples**

Practice techniques taught in this lesson. Create 90%, 95%, and 99% confidence  $t$  intervals for mean differences when the population standard deviation is unknown. Use a table to produce critical  $t$  values.

Duration: 1 hr Scoring: 25 points

**Study: Hypothesis Test for the Difference of Two Independent Samples**

Look at how to do significance testing for the difference of two independent samples. Compare different methods for

computing degrees of freedom, including the conservative method, pooling variances, and software.

Duration: 0 hrs 50 mins

### **Practice: Hypothesis Test for the Difference of Two Independent Samples**

Look at how to do significance testing for the difference of two independent samples. Compare different methods for computing degrees of freedom, including the conservative method, pooling variances, and software.

Duration: 0 hrs 30 mins

### **Quiz: Two-Sample $t$ Tests**

Work on two-sample  $t$  tests using the formula, tables, and your graphing calculator. Compare results using different degrees of freedom.

Duration: 1 hr Scoring: 10 points

### **Practice: More Two-Sample $t$ Tests**

Work on two-sample  $t$  tests for means, using the formula and tables. Solve the same problems using confidence intervals.

Duration: 1 hr

### **Quiz: Confidence Intervals and Significance Testing for Means**

Test your understanding of various significance tests. Review uses of confidence intervals.

Duration: 1 hr Scoring: 10 points

## **LESSON 4: UNIT WRAP-UP**

### **Discuss: What Is Interesting? What Is Confusing?**

Discuss concepts you find interesting or confusing in an informal setting.

Duration: 0 hrs 30 mins Scoring: 10 points

### **Review: $t$ Distribution for Means**

Review your studies of  $t$  distribution for means.

Duration: 3 hrs 30 mins

### **Test (CS): $t$ Distribution for Means**

Take a 20-minute test covering confidence intervals and hypothesis testing for a single mean and for two independent samples, and the difference between two means.

Duration: 0 hrs 20 mins Scoring: 48 points

### **Test (TS): $t$ Distribution for Means**

Take a 30-minute test covering confidence intervals and hypothesis testing for a single mean and for two independent samples, and the difference between two means.

Duration: 0 hrs 30 mins Scoring: 52 points

## **UNIT 9: INFERENCE FOR PROPORTIONS**

### **LESSON 1: CONFIDENCE INTERVALS AND HYPOTHESIS TESTS FOR A SINGLE POPULATION PROPORTION**

#### **Study: Confidence Interval for a Single Population Proportion**

Look at confidence intervals for a single population proportion and sample size for a given margin of error.

Duration: 0 hrs 50 mins

#### **Practice: Confidence Interval for a Single Population Proportion**

Look at confidence intervals for a single population proportion and sample size for a given margin of error.

Duration: 0 hrs 30 mins

#### **Practice: Creating $z$ -Intervals for a Single Population Proportion**

Create 90%, 95%, and 99%  $z$ -intervals for problems using the formula and table or the InvNorm function on your graphing calculator.

Duration: 1 hr

#### **Quiz: Finding the Sample Size for a Given Margin of Error for a Single Population Proportion**

Practice finding the sample size for a given margin of error.

Duration: 1 hr Scoring: 10 points

### **Practice: Confidence Intervals for a Single Population Proportion**

Apply various techniques to solve problems and create intervals for proportions using the formula and the graphing calculator's STAT TESTS function. Calculate the sample size  $n$  needed to produce a given confidence interval.

Duration: 1 hr Scoring: 25 points

### **Study: Significance Testing for Proportions**

Examine one- and two-tailed significance-testing problems.

Duration: 0 hrs 50 mins

### **Practice: Significance Testing for Proportions**

Examine one- and two-tailed significance-testing problems.

Duration: 0 hrs 30 mins

### **Practice: One- and Two-Tailed Significance Tests for a Single Population Proportion**

Perform one- and two-tailed significance tests for proportions. Work on parallel problems: a confidence interval for proportions and its corresponding two-tailed significance test. Justify that the conclusions match.

Duration: 1 hr

### **Quiz: More One- and Two-Tailed Significance Tests for a Single Population Proportion**

Perform one- and two-tailed significance tests for proportions.

Duration: 1 hr Scoring: 10 points

## **LESSON 2: THE DIFFERENCE BETWEEN TWO PROPORTIONS**

### **Study: Differences Between Two Proportions**

Look at confidence intervals and significance testing for the difference between two proportions. Compare differences in computation of standard error. Study how to use your graphing calculator to test for a difference between two proportions.

Duration: 0 hrs 50 mins

### **Practice: Differences Between Two Proportions**

Look at confidence intervals and significance testing for the difference between two proportions. Compare differences in computation of standard error. Study how to use your graphing calculator to test for a difference between two proportions.

Duration: 0 hrs 30 mins

### **Practice: Differences Between Two Proportions**

Create 90%, 95%, and 99% confidence intervals and do significance tests for the differences between proportions.

Duration: 1 hr Scoring: 25 points

### **Practice: Significance Tests for One and Two Proportions**

Choose confidence intervals and do significance tests on one- and two-proportion problems.

Duration: 1 hr

### **Quiz: Inference for Means and Proportions**

Identify elements of confidence intervals or significance tests needed in a variety of situations.

Duration: 1 hr Scoring: 10 points

## **LESSON 3: UNIT WRAP-UP**

### **Discuss: What Is Interesting? What Is Confusing?**

Discuss concepts you find interesting or confusing in an informal setting.

Duration: 0 hrs 30 mins Scoring: 10 points

### **Review: Inference for Proportions**

Review your studies of inference for proportions.

Duration: 3 hrs 30 mins

**Test (CS): Inference for Proportions**

Take a 20-minute test covering confidence intervals and hypothesis tests for a single population proportion and the difference between two proportions.

Duration: 0 hrs 20 mins Scoring: 48 points

**Test (TS): Inference for Proportions**

Take a 30-minute test covering confidence intervals and hypothesis tests for a single population proportion and the difference between two proportions.

Duration: 0 hrs 30 mins Scoring: 52 points

**UNIT 10: INFERENCE FOR TABLES AND LEAST-SQUARES****LESSON 1: ONE-WAY TABLES: CHI-SQUARE FOR GOODNESS-OF-FIT****Discuss: Roll of the Die**

Discuss the following scenario: You're given the results of a single die rolled 60 times: how many ones, twos, threes, and so on came up? Try to decide if the die is fair. (How far can outcomes deviate from what's expected by chance alone?)

Duration: 0 hrs 30 mins Scoring: 10 points

**Study: Chi-Square for Goodness-of-Fit**

Explore inference for univariate categorical data. Look at the chi-square statistic and the chi-square distribution, how to use them to test whether data fit expected values, and the assumptions needed to use the chi-square statistic.

Duration: 0 hrs 50 mins

**Practice: Chi-Square for Goodness-of-Fit**

Explore inference for univariate categorical data. Look at the chi-square statistic and the chi-square distribution, how to use them to test whether data fit expected values, and the assumptions needed to use the chi-square statistic.

Duration: 0 hrs 30 mins

**Practice: Goodness-of-Fit on Your Graphing Calculator**

Use the lists on your graphing calculator to compute a chi-square value for goodness-of-fit.

Duration: 1 hr

**Quiz: Using Chi-Square for Goodness-of-Fit**

Perform chi-square significance tests involving goodness-of-fit on problems involving dice, spinners, birthdays in different months, and the like.

Duration: 1 hr Scoring: 10 points

**LESSON 2: TWO-WAY TABLES: CHI-SQUARE FOR ASSOCIATION OR INDEPENDENCE****Study: Expected Values as an Ideal for Independence**

Study inference for bivariate categorical data in two-way tables. Look at the chi-square test for association or independence and the assumptions needed to use the test.

Duration: 0 hrs 50 mins

**Practice: Expected Values as an Ideal for Independence**

Study inference for bivariate categorical data in two-way tables. Look at the chi-square test for association or independence and the assumptions needed to use the test.

Duration: 0 hrs 30 mins

**Practice: Chi-Square Hypothesis Tests for Association or Independence**

Perform complete chi-square hypothesis tests for association or independence. Look at the assumptions needed to use chi-square.

Duration: 1 hr Scoring: 25 points

**LESSON 3: INFERENCE FOR THE LEAST-SQUARES LINE****Study: Inference for the Least-Squares Line**

Explore the linear regression line for a sample as an estimator of the least-square line for a population. Study and use the

standard error of the slope, and the  $t$  test for the slope of a regression line.

Duration: 0 hrs 50 mins

### **Practice: Inference for the Least-Squares Line**

Explore the linear regression line for a sample as an estimator of the least-square line for a population. Study and use the standard error of the slope, and the  $t$  test for the slope of a regression line.

Duration: 0 hrs 30 mins

### **Quiz: $t$ Test for the Slope of the Regression Line**

Choose a linear regression line from paired data as an estimate of the population regression line. Do  $t$  tests for the slope of the regression line.

Duration: 1 hr Scoring: 10 points

### **Practice: Graphing Calculator and MINITAB Output for Inference for the Least-Squares Line**

Practice doing a  $t$  test on your graphing calculator for the slope of the regression line. Look at how to read MINITAB output for regression.

Duration: 1 hr

### **Practice: Inference for the Least-Squares Line**

Given paired data, do a hypothesis test for the slope of the regression line using your graphing calculator. Read MINITAB output for regression and use this for a hypothesis test for the slope of the regression line.

Duration: 1 hr Scoring: 25 points

## **LESSON 4: UNIT WRAP-UP**

### **Discuss: What Is Interesting? What Is Confusing?**

Discuss concepts you find interesting or confusing in an informal setting.

Duration: 0 hrs 30 mins Scoring: 10 points

### **Review: Inference for One- and Two-Way Tables and for Least-Squares Lines**

Review your studies of inference for one- and two-way tables and for least square lines.

Duration: 3 hrs 30 mins

### **Test (CS): Inference for Tables and Least-Squares**

Take a 20-minute test covering one-way tables, two way tables, and inference for the least-squares line.

Duration: 0 hrs 20 mins Scoring: 48 points

### **Test (TS): Inference for Tables and Least-Squares**

Take a 30-minute test covering one-way tables, two way tables, and inference for the least-squares line.

Duration: 0 hrs 30 mins Scoring: 52 points

## **UNIT 11: FINAL PREPARATION FOR THE AP STATISTICS EXAM**

### **LESSON 1: GENERAL PREPARATION STRATEGIES**

#### **Study: How to Prepare for the AP Statistics Exam**

Study how to assess where you are in your preparations for the Exam, and plan how to best prepare based on your self-assessment.

Duration: 0 hrs 50 mins

#### **Practice: Action Plan**

Write an action plan for preparing for the AP Statistics Exam.

Duration: 1 hr Scoring: 25 points

#### **Discuss: Statistics as a Cohesive Whole**

Create a map that ties together the concepts covered in the statistics course. Discuss an example of how statistics is used, and list the most important concepts from the statistics course used in your example.

Duration: 1 hr Scoring: 10 points

### Quiz: Interpreting MINITAB Output

Review how MINITAB or other software packages may be used on the AP Exam.

Duration: 2 hrs Scoring: 10 points

## LESSON 2: STRATEGIES AND PRACTICE FOR MULTIPLE-CHOICE AND FREE-RESPONSE QUESTIONS

### Quiz: AP-Style Multiple-Choice Questions, Part 1

Practice answering AP-style multiple-choice questions.

Duration: 2 hrs 30 mins Scoring: 20 points

### Practice: AP-Style Free-Response Practice, Part 1

Practice with AP-style free-response questions and study how they are scored.

Duration: 2 hrs 30 mins

### Quiz: AP-Style Multiple-Choice Questions, Part 2

Practice Answering AP-style multiple-choice questions.

Duration: 2 hrs 30 mins Scoring: 20 points

### Practice: AP-Style Free-Response Practice, Part 2

More practice with AP-style free-response questions.

Duration: 2 hrs 30 mins

## LESSON 3: PUTTING IT TOGETHER: PRACTICE EXAM AND MIXED PRACTICE

### Practice: Full-Length Practice Exam

Take a full-length practice exam and study how AP Exams are scored by scoring yourself.

Duration: 5 hrs Scoring: 25 points

### Practice: Mixed Practice with Multiple-Choice and Free-Response Questions

Answer items similar to the practice exam (the format is different and you don't need to do it in one sitting).

Duration: 5 hrs

### Study: Final Wrap-Up for AP Exam

Take note of some things to think about on the Exam. Apply some final preparation suggestions.

Duration: 0 hrs 50 mins

## LESSON 4: FINAL EXAM

### Exam: Final Exam

Take the Final Exam. Good luck!

Duration: 1 hr 30 mins Scoring: 80 points

### Final Exam: Final Exam

Take the Final Exam. Good Luck!

Duration: 1 hr 30 mins Scoring: 112 points