PCTVS PASSAIC COUNTY TECHNICAL-VOCATIONAL SCHOOLS

PROBABILITY AND STATISTICS CURRICULUM
Course # 0060
3 Credits
2020

I. Course Description

Probability and Statistics is a full year study designed primarily as a preparation course for college, technical school or junior college. The key components in probability are probability terms, the concept of the probability of an event, predicting and determining probabilities, expected value, the relationship between theoretical and experimental probabilities, and compound events. In statistics, the key components are data collection, organization, representation, sampling, central tendency, variance and correlation, and analysis and inference.

Probability and Statistics are the mathematics used to understand chance and to collect, organize, describe, and analyze numerical data. From weather reports to sophisticated studies of genetics, from election results to product preference survey, probability and statistical language and concepts are increasingly present in the media and in everyday conversations. Students need this mathematics to help them judge the correctness of an argument supported by seemingly persuasive data.

Course topics will include the study of introduction to statistics, summarizing and graphing data, statistics for describing, exploring, and comparing data, probability, discrete probability distributions, normal probability distributions, estimates and sample sizes, hypothesis testing, inferences from two samples, and correlation and regression. Graphing calculators, Excel, GeoGebra and real life applications are used throughout the course to develop conceptual understanding and analysis of data.

By the end of the course students will be sensible, critical users of probability and statistics, able to apply the processes and principles developed in this course to real-world problems. Students should not think that those people who did not win the lottery yesterday have a greater chance of winning today! They should not believe an argument merely because various statistics are offered. Rather, they should be able to judge whether the statistics are meaningful and are being used appropriately.

II. Units:

Unit 1

Content Area:	**Probability and Statistics**	**Grade(s)**	**10, 11 & 12**
Unit Plan Title:	**Unit 1 – The Nature and Probability of Statistics, Frequency Distributions and Graphs, Data Description** (30-35%) *Here we introduce broadly the concepts of probability and statisitics, how we can describe such things using tables and graphs and how we can use data to generate various descriptive statistics.* **I.** The Nature and Probability of Statistics (15 days) 1. Descriptive and Inferential Statistics 2. Variables and Types of Data 3. Data Collections and Sampling Techniques		

4. Experimental Design

II. Frequency Distribution and Graphs (20 days)

1. Organizing Data (1.Categorical Frequency Distributions. 2. Grouped Frequency Distributions)
2. Histograms, Frequency Polygons and Ogives (1.Histogram, 2. The frequency polygon, 3.The Ogive, 4. Relative Frequency Graphs, 5. Distribution Shapes)
3. Other Types of Graphs (1. Bar Graphs, 2. Pareto Charts, 3. Time series graph, 4. The Pie Graph, 5. The Dot Plots, 5. Stem and Leaf Plots, 6. Misleading Graphs)

III. Data Description (25 days)

1. Measures of Central Tendency
2. Measures of Variation
3. Measures of Position
4. Exploratory Data Analysis

NJSLS Standard(s) Addressed in this unit

S-ID A 1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
S-ID A 2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
S-ID A 3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
S-ID A 4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
S-ID B 5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
S-ID B 6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

Essential Questions (3-5)

What is data, and what is statistics?
How can we organize and communicate data effectively?
How can we describe a data set efficiently and effectively?

Anchor Text

Elementary Statistics : A step by step approach Authors : Allan G. Bluman, 10th Edition ISBN: 9781259755330

Informational Texts (3-5)

Bock, David E., Paul F. Velleman, and Richard D. DeVeaux. *Stats: Modeling the World*. Boston: Pearson.
Moore, David S., George P. McCabe and Bruce Craig. *Introduction to Practice of Statistics*. New York: W. H. Freeman Co./BFW

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Short Texts (1-3)

How to Lie with Statistics by Darrell Huff; Irving Geis **ISBN-13:** 0393052648 9780393052640 039309426X 9780393094268

Formative & Summative Assessments

Formative Assessment
Homework
Quiz
Chapter test
Classwork
Marking Period Pre Test

Summative Assessment
Marking Period Post Test
Project
Final Exam

Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

TI Nspire Cas Graphing Calculator
Excel
Google Sheets
Canvas
http://www.lock5stat.com/StatKey/index.html
http://onlinestatbook.com
www.againstallodds.com
https://www.khanacademy.org/math/statistics-probability
https://www.desmos.com/calculator
http://apcentral.collegeboard.com/apc/members/exam/exam_information/8357.html
http://stattrek.com/tutorials/ap-statistics-tutorial.aspx
http://www.state.nj.us/education/cccs/2016/math/standards.pdf
http://www.state.nj.us/education/cccs/2014/tech/
https://www.cengagebrain.com/shop
https://login.cengage.com/cb/
www.deltamath.com

Suggested Time Frame:	60 Days

Unit 2

Content Area:	Probability and Statistics	Grade(s)	10, 11 & 12
Unit Plan Title:	**Unit 2 – Probability, Discrete Probability Distributions, Normal Probability Distributions (30-35%)** *Here we will explore probability as it behaves in various situations and then extend this to distributions of those probabalities, ending with distribution models both discrete (geometric, Poisson, binomial) and normal.* **I.** Probability and counting rules (20days) 1. Sample Space and Probability 2. Addition rules for Probability 3. Multiplication rules and Conditional Probability 4. Counting Principals **II.** Discrete Probability Distributions (20 days) 1. Probability Distributions 2. Mean, Variance, Standard Deviation and Expectation 3. Binomial Distribution 4. Other Distributions **III.** Normal Probability Distributions (20 days) 1. Normal Distributions 2. Applications of Normal Distribution 3. The Central Limit Theorem 4. Normal as Approximation to Binomial		

NJSLS Standard(s) Addressed in this unit

S-CP A 1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").

S-CP A 2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

S-CP A 3 Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.

S-CP A 4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.

S-CP A 5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer. Use the rules of probability to compute probabilities of compound

S-CP B 6 Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

S-CP B 7 Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

S-CP B 8 (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.

S-CP B 9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

S-MD A 1(+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

S-MD A 2(+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

S-MD A 3(+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.

S-MD A 4(+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?

S-MD B 5(+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.

S-MD B 5a. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fastfood restaurant.

S-MD B 5b. Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.

Essential Questions (3-5)

What is probability, and how do we find the probability of certain events in various circumstances?

What is a random variable, what are some distributions of common random variables, and can you use these distributions to calculate probabilities associated with these random variables?

What is the normal distribution, what random variables behave according to it, and what does the central limit theorem say regarding the normal distribution and sampling?

Anchor Text

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Formative & Summative Assessments

Formative Assessment	Summative Assessment
Homework	Marking Period Post Test
Quiz	Project
Chapter test	Final Exam
Classwork	
Marking Period Pre Test	

Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

TI Nspire Cas Graphing Calculator
Excel
Google Sheets
Canvas
http://www.lock5stat.com/StatKey/index.html
http://onlinestatbook.com
www.againstallodds.com
https://www.khanacademy.org/math/statistics-probability
https://www.desmos.com/calculator
http://apcentral.collegeboard.com/apc/members/exam/exam_information/8357.html
http://stattrek.com/tutorials/ap-statistics-tutorial.aspx
http://www.state.nj.us/education/cccs/2016/math/standards.pdf
http://www.state.nj.us/education/cccs/2014/tech/
https://www.cengagebrain.com/shop
https://login.cengage.com/cb/
www.deltamath.com

Suggested Time Frame:	60 Days

Unit 3

Content Area:	Probability and Statistics	Grade(s)	10, 11 & 12
Unit Plan Title:	**Unit 3 – Confidence Intervals, Hypothesis Testing, Inferences from two samples, Correlation and Regression** (30-35%) *Probability is the tool used for anticipating what the distribution of data should look like under a given model.* **I.** Confidence Intervals and Sample Size (15 days) 1. Confidence Intervals for the Mean when σ is known. 2. Confidence Intervals for the Mean When σ Is Unknown 3. Confidence intervals for Sample size of Proportions 4. Confidence intervals for variances and standard deviatons **II.** Hypothesis Testing (17 days) 1. Steps in Hypothesis Testing – Traditional Method 2. Z Test for a Mean 3. T Test for a Mean 4. Z Test for a Proportion 5. Chi-Suared Test for a Variance or Standard Deviation 6. Additional Topics Regarding Hypothesis Testing **III.** Testing the differences between two means, two proportions, and two variances. (18 days) 1. Testing the difference Between Two Means: Using the z Test 2. Testing the difference Between Two Means of Independent Samples: Using the t Test 3. Testing the Difference Between Two Means: Dependent Samples 4. Testing the Difference Between Proportions 5. Testing the Difference Between Two Variances **IV.** Correlation and Regression (10 days) 1. Scatterplots and Correlation 2. Regression 3. Coefficient of Determination and Standard Error of the Estimate		

NJSLS Standard(s) Addressed in this unit
S-MD A. 1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. S-MD A. 2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

S-MD A. 3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.*
S-MD A. 4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*
S-*MD B. 5. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.*
S-*MD B. 5. a.* Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast food restaurant.
S-*MD B. 5. b. Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*
S-MD B. 6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
S-MD B. 7. (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).
S-IC B. 4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
S-IC B. 6. Evaluate reports based on data.
S-ID A. 4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
S-ID C. 7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Essential Questions (3-5)

Can you create a proper confidence interval for a given statistical situation?
Can you identify and perform the correct hypothesis test given a specific statisitical situation?
Can you correctly perform a test for a statistical difference between two give statitics?
Can you determine the correlation between two given variables ?
How do you choose a coorect regression model for a given situation?

Anchor Text

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Formative & Summative Assessments

Formative Assessment	Summative Assessment
Homework	Marking Period Post Test
Quiz	Project
Chapter test	Final Exam
Classwork	
Marking Period Pre Test	

Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

TI Nspire Cas Graphing Calculator
Excel
Google sheets
Canvas
https://www.khanacademy.org/math/statistics-probability
https://www.desmos.com/calculator
http://apcentral.collegeboard.com/apc/members/exam/exam_information/8357.html
http://stattrek.com/tutorials/ap-statistics-tutorial.aspx
http://www.state.nj.us/education/cccs/2016/math/standards.pdf
http://www.state.nj.us/education/cccs/2014/tech/
https://www.cengagebrain.com/shop
https://login.cengage.com/cb/

Suggested Time Frame:	40 Days

Use of Graphing Calculators and Computers

The graphing calculator and computer are essential tools for structured inquiry in Statistics. A computer alongside Google Sheets and Microsoft Excel will be used for sharing, shaping, and anazlying data. Students will use their graphing calculator extensively throughout the course. Most assignments, numerous class activities and tests will require the use of a graphing calculator. Students will also use a computer and utilize statistics software, MS Excel as well as some Internet applets.

III. Instructional Strategies

Lecture
Graphs and other visuals
Student investigative activities
Engaging in discussions
Reading silently and aloud
Brainstorming
Listening
Participating in small and large groups
Collaborative projects
Answering questions (oral and written)
Summarizing
Debating
Analyzing data, discussions, etc.
Peer teaching
Playing games
Note taking
Writing

Differentiated Instruction

Students will work individually, engage in cooperative learning, and utilize discovery learning on certain activities. Through the use of lectures, the internet, and interactive whiteboards, students will be exposed to various teaching methods to appeal to visual, auditory, and kinesthetic learners. Students will be given copies of data sets and other important notes.

IV. Methods of Student Evaluation

Assessment can be divided into two general categories: formal (graded) and informal/classroom-based (both graded and ungraded). The key to effectively assessing a student's mastery of skills is to match the assessment method to the learning objective.

Formative Assessment
Homework
Quiz
Chapter test

Classwork
Group Exploratory Activities

Summative Assessment
Marking Period Pre Test
Period Post Test
Project
Exam

V. Scope and Sequence

Key: I – Introduced, D-developed in Depth, R-Reinforced

Skill/Concepts to be Learned	**10**	**11**	**12**
In examining distributions of data, students should be able to detect important characteristics, such as shape, location, variability and unusual values.	IDR	IDR	IDR
From careful observations of patterns in data, students can generate conjectures about relationships among variables.	IDR	IDR	IDR
The notion of how one variable may be associated with another permeates almost all of statistics, from simple comparisons of proportions through linear regression.	IDR	IDR	IDR
The difference between association and causation must accompany this conceptual development throughout.	IDR	IDR	IDR
If data are to be collected to provide an answer to a question of interest, a careful plan must be developed.	IDR	IDR	IDR
Both the type of analysis that is appropriate and the nature of conclusions that can be drawn from that analysis depend in a critical way on how the data was collected.	IDR	IDR	IDR
Collecting data in a reasonable way, through either sampling or experimentation, is an essential step in the data analysis process.	IDR	IDR	IDR
Random phenomena are not haphazard: they display an order that emerges only in the long run and is described by a distribution.	IDR	IDR	IDR
The mathematical description of variation is central to statistics.	IDR	IDR	IDR
The probability required for statistical inference is not primarily axiomatic or combinatorial but is oriented toward using probability distributions to describe data.	IDR	IDR	IDR
Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods.	IDR	IDR	IDR
Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how con dent one can be about the selection.	IDR	IDR	IDR
Use technology to: Describe patterns and departures from patterns; Plan and conduct a study; Explore random phenomena using probability and simulation; and Estimate population parameters and test hypotheses.	IDR	IDR	IDR

VI.Textbooks, Instructional Resources and Software

Resources for Students (t.b.o.)	Resources for Teachers (t.b.o)
Digital *Canvas Test Banks* : **Elementary Statistics : A step by step approach** Authors : Allan G. Bluman, 10th Edition ISBN: 9781259755330 **Print** **Elementary Statistics : A step by step approach** Authors : Allan G. Bluman, 10th Edition ISBN: 9781259755330	**Digital** *Canvas Test Banks* : **Elementary Statistics : A step by step approach** Authors : Allan G. Bluman, 10th Edition ISBN: 9781259755330 **Print** **Teachers Edition of Elementary Statistics : A step by step approach** Authors : Allan G. Bluman, 10th Edition ISBN: 9781259755330

VII.Probability and Statistics Curriculum Correlation Chart with Textbook

Probability and Statistics Topic	Corresponding Text Sections
I. The Nature and Probability of Statistics	
1. Descriptive and Inferential Statistics	1.1
2. Variables and Types of Data	1.2
3. Data Collections and Sampling Techniques	1.3
4. Experimental Design	1.4
II. Frequency Distribution and Graphs	
1. Organizing Data	2.1
2. Histograms, Frequency Polygons and Ogives	2.2
3. Other Types of Graphs	2.3
III. Data Description	
1. Measures of Central Tendency	3.1
2. Measures of Variation	3.2
3. Measures of Position	3.3
4. Exploratory Data Analysis	3.4

IV. Probability and Counting Rules	
1. Sample Spaces and Probability	4.1
2. The Addition Rule for Probability	4.2
3. Multiplication Rules and Conditional Probability	4.3
4. Counting Rules	4.4
5. Probability and Counting Rules	4.5
V. Discrete Probability Distributions	
1. Normal Distributions	5.1
2. Applications of Normal Distribution	5.2
3. The Central Limit Theorem	5.3
4. Normal as Approximation to Binomial	5.4
VI. Normal Probability Distributions	
1. Normal Distributions	6.1
2. Applications of Normal Distribution	6.2
3. The Central Limit Theorem	6.3
4. Normal as Approximation to Binomial	6.4
VII. Confidence Intervals and Sample Size	
1. Confidence Intervals for the Mean when σ is known	7.1
2. Confidence Intervals for the Mean when σ is unknown	7.2
3. Confidence Intervals for the Sample Size of Proportions	7.3
VIII. Hypothesis Testing	
1. Steps in Hypothesis Testing – Traditional Method	8.1
2. Z Test for a Mean	8.2
3. T Test for a Mean	8.3
4. Z Test for a Proportion	8.4
5. Chi-Squared Test for a Variance or Standard Deviation	8.5
6. Additional Topics Regarding Hypothesis Testing	8.6
IX. Testing the Differences Between Two Means, Two Proportions, and Two Variances	
1. Testing the difference between two means: Using the *z* Test	9.1
2. Testing the difference between two means of independent samples: using the *t* test	9.2

3. Testing the difference between two means: dependent samples	9.3
4. Testing the difference between proportions	9.4

X. Correlation and Regression	
1. Scatterplots and Correlation	10.1
2. Regression	10.2
3. Coefficient of Determination and Standard Error of the Estimate	10.3

IV. Student Handout

Probability an Statistics Course Overview

Probability and Statistics is a full year study designed primarily as a preparation course for college, technical school or junior college. The key components in probability are probability terms, the concept of the probability of an event, predicting and determining probabilities, expected value, the relationship between theoretical and experimental probabilities, and compound events. In statistics, the key components are data collection, organization, representation, sampling, central tendency, variance and correlation, and analysis and inference.

Probability and Statistics are the mathematics used to understand chance and to collect, organize, describe, and analyze numerical data. From weather reports to sophisticated studies of genetics, from election results to product preference survey, probability and statistical language and concepts are increasingly present in the media and in everyday conversations. Students need this mathematics to help them judge the correctness of an argument supported by seemingly persuasive data.

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By the end of the course students will be sensible, critical users of probability and statistics, able to apply the processes and principles developed in this course to real-world problems. Students should not think that those people who did not win the lottery yesterday have a greater chance of winning today! They should not believe an argument merely because various statistics are offered. Rather, they should be able to judge whether the statistics are meaningful and are being used appropriately.

Poficiencies:

Demonstrate Knowledge of statistical terms.
Differentiate between the branches of statistics.
Identify Types of Data.
Identify four basic sampling techniques.
Explain difference between observational and experimental studies.
Explain how statistics can be used and misused.
Organize data using a frequency distribution.

Represent data in frequency distributions graphically with histograms, frequency polygons, and ogives.
Represent data using bar graphs, Pareto charts, time series graphs, pie graphs, and dotplots.
Draw and interpret Stem and Leaf Plots.
Summarize Data using measures of central tendency such as mean, median, and mode.
Describe data, using measures of variation, such as the range, variance, and standard deviation.
Identify the position of a data value in a data set, using measures of position, such as percentiles, deciles, and quartiles.
Use the techniques of exploratory data analysis, including boxplots and five number summaries, to discover various aspects of the data.
Determining sample spaces and find the probability of an event, using classical probability or empirical probability.
Find the probability of compound events using addition and multiplication rules.
Find the conditional probability of an event
Find the total number of outcomes in a sequence of events using the fundamental counting rule.
Find the number of ways the r objects can be selected from n objects, using permutation rule.
Find the number of ways the r objects can be selected from n objects without regard to order, using the combination rule.
Find the probability of an event, using the counting rules.
Construct a probability distribution for a random variable.
Find mean, variance, standard deviation and expected value for a discrete random variable.
Find the exact probability for X successes in n trials of a binomial experiment.
Find the mean, variance, and standard deviation for the variable of a binomial distribution.
Find the probabilities for outcomes of variables, using the Poisson, geometric.
Identify the properties of a normal distribution.
Identify distributions as symmetric or skewed.
Find the area under the standard normal distribution, given various z values.
Find the probabilities for a normally distributed carriable by transforming it into a standard normal variable.
Find specific data values for given percentages using standard normal distribution.
Use the central limit theorem to solve problems involving sample means for large samples.
Use the normal approximations to compute probabilities for a binomial variable.
Find the confidence interval for the mean when σ is known.
Determine the minimum sample size for finding a confidence interval for the mean.
Find the confidence interval for the mean when σ is unknown.
Find the confidence interval for a proportion.
Determine the minimum sample size for finding a confidence interval for a proportion.
Understand the definitions used in hypothesis testing.
State the null and alternative hypotheses.
Find the critical values for the z test.
State the five steps used in hypothesis testing.
Test means when σ is known using z test.
Test means when σ is unknown, using t test.
Test proportions using z test.
Test variances or standard deviations, using the chi-square test.

Test hypothesis using confidence intervals.
Explain type I and type II errors.
Test the differences between two means using z test.
Test the difference between two means for independent samples, using the *t* test.
Test the difference between two means for dependent samples.
Test the difference between two proportions
Draw a scatter plot for a set of ordered pairs.
Compute the correlation coefficient.
Test the hypothesis $H_O : \rho = 0$.
Compute the equation of the regression line.
Compute the coefficient of determination.
Compute the standard error of the estimate.
Find a prediction interval.