AP Statistics

Curriculum/Content Area: Mathematics	Course Length: 2 terms
Course Title: AP Statistics	**Date last reviewed:** 2019 Link Previous UbD (for work team reference)
Prerequisites: Algebra 2	**Board approval date: November 2019**
Primary Resource: The Practice of Statistics (2nd ed.) Yates, Moore,. Starnes	

Desired Results

Course description and purpose: The purpose of Advanced Placement Statistics is to introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students are exposed to four broad themes: Organizing Data, Producing Data, Probability, and Statistical Inference.

Priority AP Statistics Course Skills
The AP Statistics Course Skills are distinct skills that students should practice throughout the year—skills that will help them learn to think and act like statisticians.
1. Selecting Statistical Methods: Select methods for collecting and/or analyzing data for statistical inference.
2. Data Analysis: Describe patterns, trends, associations, and relationships in data.
3. Using Probability and Simulation: Explore random phenomena.
4. Statistical Argumentation: Develop an explanation or justify a conclusion using evidence from data, definitions, or statistical inference.

Big Ideas	Enduring Understandings	Learning Objectives
1.Variation and Distribution(VAR)	Given that variation may be random or not, conclusions are uncertain.(VAR-1)	A. Identify questions to be answered, based on variation in one-variable data. B. Identify variables in a set of data. C. Classify types of variables. D. Identify questions to be answered about possible relationships in data. E. Identify questions to be answered about data collection methods. F. Identify questions suggested by patterns in data. G. Identify questions suggested by

		variation in statistics for samples collected from the same population. H. Identify questions suggested by variation in the shapes of distributions of samples taken from the same population. I. Identify questions suggested by probabilities of errors in statistical inference. J. Identify questions suggested by variation between observed and expected counts in categorical data. K. Identify questions suggested by variation in scatter plots.
	The normal distribution can be used to represent some population distributions. (VAR-2)	A. Compare a data distribution to the normal distribution model. B. Determine proportions and percentiles from a normal distribution. C. Compare measures of relative position in data sets.
	Well-designed experiments can establish evidence of causal relationships. (VAR-3)	A. Identify the components of an experiment. B. Describe elements of a well-designed experiment. C. Compare experimental designs and methods. D. Explain why a particular experimental design is appropriate. E. Interpret the results of a well-designed experiment
	The likelihood of a random event can be quantified. (VAR-4)	A. Calculate the probabilities for events and their complements. B. Interpret probabilities for events. C. Explain why two events are (or are not) mutually exclusive. D. Calculate conditional probabilities. E. Calculate probabilities for independent events and for the union of two events.
	Probability distributions may be used to model variation in populations. (VAR-5)	A. Represent the probability distribution for a discrete random variable. B. Interpret a probability distribution. C. Calculate the parameters for a discrete random variable. D. Interpret parameters for a discrete random variable. E. Calculate parameters for linear combinations of random variables. F. Describe the effects of linear

		transformations of parameters on random variables
	The normal distribution may be used to model variation. (VAR-6)	A. Calculate the probability that a particular value lies in a given interval of normal distribution. B. Determine the interval associated with a given area in a normal distribution. C. Determine the appropriateness of using the normal distribution to approximate probabilities for unknown distributions. D. Identify the null and alternative hypotheses for a population proportion. E. Identify an appropriate testing method for a population proportion. F. Verify the conditions for making statistical inferences when testing a population proportion. G. Calculate an appropriate test statistic and *p*-value for a population proportion. H. Identify the null and alternative hypotheses for a difference of two population proportions. I. Identify an appropriate testing method for the difference of two population proportions. J. Verify the conditions for making statistical inferences when testing a difference of two population proportions. K. Calculate an appropriate test statistic for the difference of two population proportions.
	The t-distribution may be used to model variation. (VAR-7)	A. Describe t-distributions B. Identify an appropriate testing method for a population mean with unknown standard deviation, including the mean difference between values in matched pairs. C. Identify the null and alternative hypotheses for a population mean with unknown standard deviation, including mean difference between values in matched pairs. D. Verify the conditions for the test for a population mean, including the mean difference between values in a matched pair. E. Calculate an appropriate test statistic for a population mean, including the mean difference between values in matched pairs.

		F. Identify an appropriate selection of a testing method for a difference of two population means. G. Identify the null and alternative hypotheses for a difference for two population means. H. Verify the conditions for the significance test for the difference of two population means. I. Calculate an appropriate test statistic for a difference in two means. J. Identify the appropriate selection of a testing method for a slope of a regression model. K. Identify appropriate null and alternative hypotheses for a slope of a regression model. L. Verify the conditions for the significance test for the slope of a regression model. M. Calculate an appropriate test statistic for the slope of a regression model.
	The chi-square distribution may be used to model variation. (VAR-8)	A. Describe chi-square distributions B. Identify the null and alternative hypotheses in a test for a distribution of proportions in a set of categorical data. C. Identify an appropriate testing method for a distribution of proportions in a set of categorical data. D. Calculate expected counts for the chi-square test for goodness of fit. E. Verify the conditions for making statistical inferences when testing goodness of fit for a chi-square distribution. F. Calculate the appropriate statistic for the chi-square test for goodness of fit. G. Determine the *p*-value for chi-square test for goodness of fit significance test. H. Calculate expected counts for two-way tables of categorical data. I. Identify the null and alternative hypotheses for a chi-square test for homogeneity or independence. J. Identify an appropriate testing method for comparing distributions in two-way tables of categorical data. K. Verify the conditions for making statistical inferences when testing a chi-square distribution for independence or homogeneity. L. Calculate the appropriate statistics for a chi-square test for homogeneity or

		independence. M. Determine the *p*-value for a chi-square significance test for independence or homogeneity.
2. Patterns and Uncertainty(UNC)	Graphical representations and statistics allow us to identify and represent key features of data. (UNC-1)	A. Represent categorical data using frequency or relative frequency tables. B. Describe categorical data represented in frequency or relative frequency tables. C. Represent categorical data graphically. D. Describe categorical data represented graphically. E. Compare multiple sets of categorical data. F. Classify types of quantitative variables.. G. Represent quantitative data graphically. H. Describe the characteristics of quantitative data distributions. I. Calculate measures of center and position for quantitative data. J. Calculate measures of variability for quantitative data. K. Explain the selection of a particular measure of center and/or variability for describing a set of quantitative data. L. Represent summary statistics for quantitative data graphically. M. Describe summary statistics of quantitative data represented graphically. N. Compare graphical representations for multiple sets of quantitative data. O. Compare summary statistics for multiple sets of quantitative data. P. Compare numerical and graphical representations for two categorical variables. Q. Calculate statistics for two categorical variables. R. Compare statistics for two categorical variables. S. Represent bivariate quantitative data using scatter plots.
	Simulation allows us to anticipate patterns in data. (UNC-2)	A. Estimate probabilities using simulation.
	Probabilistic reasoning allows us to anticipate patterns in data. (UNC-3)	A. Estimate probabilities of binomial random variables using data form simulations. B. Calculate probabilities for a binomial

		distribution. C. Calculate parameters for a binomial distribution. D. Interpret probabilities and parameters for a binomial distribution. E. Calculate probabilities for geometric random variables. F. Calculate parameters of a geometric distribution. G. Interpret probabilities and parameters for a geometric distribution. H. Estimate sampling distributions using simulation. I. Explain why an estimator is or is not unbiased. J. Calculate estimates for a population parameter. K. Determine parameters of a sampling distribution for sample proportions. L. Determine whether a sampling distribution for a sample proportion can be described as approximately normal. M. Interpret probabilities and parameters for a sampling distribution for a sample proportion. N. Determine parameters of a sampling distribution for a difference in sample proportions. O. Determine whether a sampling distribution for a difference of sample proportions can be described as approximately normal. P. Interpret probabilities and parameters for a sampling distribution for a difference in proportions. Q. Determine parameters for a sampling distribution for sample means. R. Determine whether a sampling distribution of a sample mean can be described as approximately normal. S. Interpret probabilities and parameters for a sampling distribution for a sample mean. T. Determine parameters of a sampling distribution for a difference in sample means. U. Determine whether a sampling distribution of a difference in sample means can be described as approximately normal. V. Interpret probabilities and parameters for a sampling distribution for a difference in sample means.

	An interval of values should be used to estimate parameters, in order to account for uncertainty. (UNC-4)	A. Identify an appropriate confidence interval procedure for a population proportion. B. Verify the conditions for calculating confidence intervals for a population proportion. C. Determine the margin of error for a given sample size that will result in a given margin of error for a population proportion. D. Calculate the appropriate confidence interval for a population proportion. E. Calculate an interval estimate based on a confidence interval for a population proportion. F. Interpret a confidence interval for a population proportion. G. Justify a claim based on a confidence interval for a population proportion. H. Identify the relationships between sample size, width of a confidence interval, and margin of error for a population. I. Identify an appropriate confidence interval procedure for a comparison of population proportions. J. Verify the conditions for calculating a confidence interval for a difference between population proportions. K. Calculate an appropriate confidence interval for a comparison of population proportions. L. Calculate an interval estimate based on a confidence interval for a difference of proportions. M. Interpret a confidence interval for a difference of proportions. N. Justify a claim based on a confidence interval for a difference of proportions. O. Identify an appropriate confidence interval procedure for a population mean, including the mean difference between values in matched pairs. P. Verify the conditions for calculating confidence intervals for a population mean, including the mean difference between values in matched pairs. Q. Determine the margin of error for a given sample size for a one-sample t-interval. R. Calculate an appropriate confidence interval for a population mean, including the mean difference between values in

		matched pairs. S. Interpret a confidence interval for a population mean, including the mean difference between values in matched pairs. T. Justify a claim based on a confidence interval for a population mean, including the mean difference between values in matched pairs. U. Identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population mean. V. Identify an appropriate confidence interval procedure for a difference of two population means. W. Verify the conditions to calculate confidence intervals for the difference of two population means. X. Determine the margin of error for the difference of two population means. Y. Calculate an appropriate confidence interval for a difference of two population means. Z. Interpret a confidence interval for a difference of population means. AA. Justify a claim based on a confidence interval for a difference of population means. AB. Identify the effects of sample size on the width of a confidence interval for the difference of two means. AC. Identify an appropriate confidence interval procedure for a slope of a regression model. AD. Verify the conditions to calculate confidence intervals for the slope of a regression model. AE. Determine the given margin of error for the slope of a regression model. AF. Calculate an appropriate confidence interval for the slope of a regression model. AG. Interpret a confidence interval for the slope of a regression model. AH. Justify a claim based on a confidence interval for the slope of a regression model. AI. Identify the effects of sample size on the width of a confidence interval for the slope of the regression model.

	Probabilities of Type I and Type II errors influence inference. (UNC-5)	A. Identify Type I and Type II errors. B. Calculate the probabilities of a Type I and Type II errors. C. Identify factors that affect the probability of errors in significance testing. D. Interpret Type I and Type II errors.
3. Data-Based Predictions, Decisions, and Conclusions(DAT)	Regression models may allow us to predict responses to changes in an explanatory variable. (DAT-1)	A. Describe the characteristics of a scatter plot B. Determine the correlation for a linear relationship. C. Interpret the correlation for a linear relationship. D. Calculate a predicted response value using a linear regression model. E. Represent differences between measured and predicted responses using residual plots. F. Describe the form of association of bivariate data using residual plots. G. Estimate parameters for the least-squares regression line model. H. Interpret coefficients for the least-squares regression model. I. Identify influential points in regression. J. Calculate a predicted response using a least-squares regression line for a transformed data set.
	The way we collect data influences what we can and cannot say about a population. (DAT-2)	A. Identify the type of a study. B. Identify appropriate generalizations and determinations based on observational studies. C. Identify a sampling method, given a description of a study. D. Explain why a particular sampling method is or is not appropriate for a given situation. E. Identify potential sources of bias in sampling methods.
	Significance testing allows us to make decisions about hypotheses within a particular context. (DAT-3)	A. Interpret the *p*-value of a significance test for population proportion. B. Justify a claim about a population based on the results of a significance test for a population proportion. C. Interpret the *p*-value of a significance test for a difference in population proportions. D. Justify a claim about a population based on the results of a significance test for a difference in population

		proportions. E. Interpret the p-value of a significance test for a population mean, including the mean difference between values in matched pairs. F. Justify a claim about a population based on the results of a significance test for a population mean. G. Interpret the p-value of a significance test for a difference of population means. H. Justify a claim about a population based on the results of a significance test for a difference of two population means in context. I. Interpret the *p*-value for the chi-square test for goodness of fit. J. Justify a claim about a population based on the results of a chi-square test for goodness of fit. K. Interpret the *p*-value for the chi-square test for homogeneity or independence. L. Justify a claim about a population based on the results of a chi-square test for homogeneity or independence. M. Interpret the *p*-value of a significance test for the slope of a regression model. N. Justify a claim about a population based on the results of significance test for the slope of a regression model.

Unit 1 -Exploring One-Variable Data

A. Represent Quantitative and Categorical Data Distributions with Graphs and Tables
B. Calculate Summary Statistics
C. Describe and Compare Distributions using Summary Statistics

Enduring Understandings

1. Given that variation may be random or not, conclusions are uncertain.(VAR-1)
2. Graphical representations and statistics allow us to identify and represent key features of data.(UNC-1)

Learning Targets

- Identify the individuals and variables in a set of data.
- Classify variables as categorical or quantitative.

- Make and interpret bar graphs for categorical data.
- Identify what makes some graphs of categorical data misleading.
- Make and interpret dot plots, stemplots, and histograms of quantitative data.
- Find and interpret the percentile of an individual value in a distribution of data.
- Estimate percentiles and individual values using a cumulative relative frequency graph.
- Identify the shape of a distribution from a graph.
- Describe the overall pattern (shape, center, and variability) of a distribution and identify any major departures from the pattern (outliers).
- Compare distributions of quantitative data using dot plots, stemplots, and histograms.
- Calculate measures of center (mean, median) for a distribution of quantitative data.
- Calculate and interpret measures of variability (range, variance, standard deviation, IQR) for a distribution of quantitative data.
- Explain how outliers and skewness affect measures of center and variability (i.e. understand the difference between resistant measures and non-resistant measures)
- Make boxplots using a 5-Number Summary of quantitative data and interpret the results.
- Identify outliers using the 1.5 X IQR rule.
- Use box plots and numerical summaries to compare distributions of quantitative data.
- Describe the effect of adding, subtracting, multiplying, or dividing by a constant on the shape, center, and variability of a distribution of data.

Assessment Evidence

Performance Assessment Options *May include, but are not limited to the following:* • Formative and Summative Assessments • AP Exam Problems	**Other assessment options** *May include, but are not limited to the following:* • Projects

Digital Tools & Supplementary Resources

TI-83/84 Calculator /AP Classroom Resources/Statistical Applets

Unit 2 -The Normal Distribution

A. Density Curves and the Normal Distributions
B. The Standard Normal Distribution/Percentiles

Enduring Understandings

1. The normal distribution can be used to represent some population distributions. (VAR-2)

Learning Targets

- Use a density curve to model distributions of quantitative data.
- Find and interpret the standardized score (z-score) of an individual value in a distribution of data.
- Use percentiles and z-scores to compare relative positions of points within a data set or between data sets.
- Identify the relative locations of the mean and median of a distribution from a density curve.

- Use the 68–95–99.7 rule to estimate (i) the proportion of values in a specified interval, or (ii) the value that corresponds to a given percentile in a Normal distribution.
- Find the proportion of values in a specified interval in a Normal distribution using Table A or technology.
- Find the value that corresponds to a given percentile in a Normal distribution using Table A or technology.
- Determine whether a distribution of data is approximately Normal from graphical and numerical evidence.

Assessment Evidence

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- AP Exam Problems

Other assessment options
May include, but are not limited to the following:

- Projects

Digital Tools & Supplementary Resources

TI-83/84 Calculator/AP Classroom Resources/Statistical Applets

Unit 3 - Exploring Two-Variable Data

A. Scatterplots and Correlation
B. Least Squares Regression
C. Transforming Relationships
D. Cautions about Correlation and Regression
E. Relations in Categorical Data/Segmented Bar Graphs

Enduring Understandings

1. Given that variation may be random or not, conclusions are uncertain.(VAR-1)
2. Graphical representations and statistics allow us to identify and represent key features of data.(UNC-1)
3. Regression models may allow us to predict responses to change in an explanatory variable.(DAT-1)

Learning Targets- I can...

- Distinguish between explanatory and response variables for quantitative data.
- Make a scatter plot to display the relationship between two quantitative variables.
- Describe the direction, form, and strength of a relationship displayed in a scatter plot and identify unusual features.
- Interpret the correlation.
- Understand the basic properties of correlation, including how the correlation is influenced by outliers.
- Distinguish correlation from causation.
- Make predictions using regression lines, keeping in mind the dangers of extrapolation.
- Calculate and interpret a residual.
- Interpret the slope and y intercept of a regression line.
- Determine the equation of a least-squares regression line using technology or computer output.

- Construct and interpret residual plots to assess whether a regression model is appropriate.
- Interpret the standard deviation of the residuals and *r*-squared and use these values to assess how well a least-squares regression line models the relationship between two variables.
- Describe how the least-squares regression line, standard deviation of the residuals, and r^2 are influenced by outliers.
- Find the slope and y intercept of the least-squares regression line from the means and standard deviations of x and y and their correlation.
- Fit exponential and power models to data by applying logarithms to transform one or both of the variables in non linear relationships.
- Determine which of several transformations does a better job of producing a linear relationship.
- Identify a lurking variable in a relationship between two variables.
- Interpret a lurking variable as either a confounding or common response effect.
- Understand that correlation applies only to linear relationships.
- Understand that correlation does not imply causation.
- Organize qualitative data in a Two-Way table.
- Find and interpret both marginal and conditional distributions.
- Create and interpret Bar graphs and Segmented Bar graphs.
- Calculate marginal and joint relative frequencies from a two-way table.
- Calculate conditional relative frequencies from a two-way table.
- Use bar graphs to compare distributions of categorical data.
- Describe the nature of the association between two categorical variables

Assessment Evidence

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Digital Tools & Supplementary Resources

TI-83/84 Calculator/AP Classroom Resources/Statistical Applets

Unit 4 - Collecting Data

A. Sampling Designs
B. Experimental Designs

Enduring Understandings

1. Given that variation may be random or not, conclusions are uncertain.(VAR-1)
2. The way we collect data influences what we can and cannot say about a population.(DAT-2)

3. Well-designed experiments can establish evidence of causal relationships. (VAR-3)

Learning Targets- I can...

- Identify the population and sample in a statistical study.
- Identify voluntary response sampling and convenience sampling and explain how these sampling methods can lead to bias.
- Describe how to select a simple random sample with technology or a table of random digits.
- Describe how to select a sample using stratified random sampling and cluster sampling, distinguish stratified random sampling from cluster sampling, and give an advantage of each method.
- Explain how undercoverage, nonresponse, question wording, and other aspects of a sample survey can lead to bias.
- Explain the concept of confounding and how it limits the ability to make cause-and-effect conclusions.
- Distinguish between an observational study and an experiment, and identify the explanatory and response variables in each type of study.
- Identify the experimental units and treatments in an experiment.
- Describe the placebo effect and the purpose of blinding in an experiment.
- Describe how to randomly assign treatments in an experiment using slips of paper, technology, or a table of random digits.
- Explain the purpose of comparison, random assignment, control, and replication in an experiment.
- Describe a completely randomized design for an experiment.
- Describe a randomized block design and a matched pairs design for an experiment and explain the purpose of blocking in an experiment.
- Explain the concept of sampling variability when making an inference about a population and how sample size affects sampling variability.
- Explain the meaning of statistically significant in the context of an experiment and use simulation to determine if the results of an experiment are statistically significant.
- Identify when it is appropriate to make an inference about a population and when it is appropriate to make an inference about cause and effect.
- Evaluate if a statistical study has been carried out in an ethical manner.

Assessment Evidence

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Unit 5- Probability, Random Variables, and Probability Distributions

A. Randomness, Probability, and Simulation
B. Probability Models

C. Probability Rules
D. Conditional Probability and Independence
E. Random Variables-Discrete and Continuous
F. Transforming and Combining Random Variables
G. Binomial and Geometric Random Variables

Enduring Understandings

1. Given that variation may be random or not, conclusions are uncertain.(VAR-1)
2. Simulation allows us to anticipate patterns in data. (UNC-2)
3. The likelihood of a random event can be quantified. (VAR-4)
4. Probability distributions may be used to model variation in populations.(VAR-5)
5. Probabilistic reasoning allows us to anticipate patterns in data. (UNC-3)

Learning Targets- I can...

- Interpret probability as a long-run relative frequency.
- Use simulation to model chance behavior.
- Give a probability model for a chance process with equally likely outcomes and use it to find the probability of an event.
- Use basic probability rules, including the complement rule and the addition rule for mutually exclusive events
- Apply the general addition rule to calculate probabilities.
- Use a two-way table or Venn diagram to model a chance process and calculate probabilities involving two events.
- Calculate and interpret conditional probabilities.
- Determine if two events are independent.
- Use the general multiplication rule to calculate probabilities.
- Use a tree diagram to model a chance process involving a sequence of outcomes and to calculate probabilities.
- When appropriate, use the multiplication rule for independent events to calculate probabilities.
- Use the probability distribution of a discrete random variable to calculate the probability of an event.
- Make a histogram to display the probability distribution of a discrete random variable and describe its shape.
- Calculate and interpret the mean (expected value) of a discrete random variable.
- Calculate and interpret the standard deviation of a discrete random variable.
- Use the probability distribution of a continuous random variable (uniform or Normal) to calculate the probability of an event.
- Describe the effect of adding or subtracting a constant or multiplying or dividing by a constant on the probability distribution of a random variable.
- Calculate the mean and standard deviation of the sum or difference of random variables.
- Find probabilities involving the sum or difference of independent Normal random variables.
- Determine whether the conditions for a binomial setting are met.
- Calculate and interpret probabilities involving binomial distributions.
- Calculate the mean and standard deviation of a binomial random variable. Interpret these values in context.
- Calculate and interpret probabilities involving binomial distributions.
- When appropriate, use the Normal approximation to the binomial distribution to calculate probabilities.
- Find probabilities involving geometric random variables.

Assessment Evidence

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Unit 6- Sampling Distributions

A. Sampling Distribution for Means
B. The Central Limit Theorem
C. Sampling Distribution for Proportions
D. Sampling Distribution for difference in Means
E. Sampling Distribution for difference in Proportions
F. Point Estimate as unbiased estimator

Enduring Understandings

1. Given that variation may be random or not, conclusions are uncertain.(VAR-1)
2. The normal distribution may be used to model variation. (VAR-6)
3. Probabilistic reasoning allows us to anticipate patterns in data. (UNC-3)

Learning Targets- I can...

- Distinguish between a parameter and a statistic.
- Create a sampling distribution using all possible samples from a small population.
- Distinguish among the distribution of a population, the distribution of a sample, and the sampling distribution of a statistic.
- Use the sampling distribution of a statistic to evaluate a claim about a parameter.
- Determine if a statistic is an unbiased estimator of a population parameter.
- Describe the relationship between sample size and the variability of a statistic.
- Calculate the mean and standard deviation of the sampling distribution of a sample proportion and interpret the standard deviation.
- Determine if the sampling distribution of a sample proportion is approximately Normal.
- Describe the shape, center, and variability of the sampling distribution for a proportion.
- If appropriate, use a Normal distribution to calculate probabilities involving a sample proportion.
- Calculate the mean and standard deviation of the sampling distribution of a sample mean and interpret the standard deviation.
- Describe the shape, center, and variability of the sampling distribution for a difference of proportions.
- Determine if the sampling distribution of a sample mean is approximately Normal.
- If appropriate, use a Normal distribution to calculate probabilities involving sample means.
- Explain how the shape of the sampling distribution of a sample mean is affected by the shape of the population distribution and the sample size.
- Describe the shape, center, and variability of the sampling distribution for a difference of proportions.

Assessment Evidence	
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Unit 7- Inference for Categorical Data: Proportions

A. Confidence Interval for Proportion
B. Hypothesis Test for Proportion
C. Confidence Interval for Difference in Proportion
D. Hypothesis Test for Difference in Proportion

Enduring Understandings

1. Given that variation may be random or not, conclusions are uncertain. (VAR-1)
2. An interval of values should be used to estimate parameters, in order to account for uncertainty. (UNC-4)
3. The normal distribution may be used to model variation. (VAR-6)
4. Significance testing allows us to make decisions about hypotheses within a particular context. (DAT-3)
5. Probabilities of Type I and Type II errors influence inference. (UNC-5)

Learning Targets- I can...

- Identify an appropriate point estimator and calculate the value of a point estimate for a population proportion.
- Construct a confidence interval for a population proportion.
- Interpret a confidence interval for a population proportion in context.
- Determine the point estimate and margin of error from a confidence interval.
- Use a confidence interval to make a decision about the value of a parameter.
- Describe how the sample size and confidence level affect the margin of error.
- Explain how practical issues like nonresponse, undercoverage, and response bias can affect the interpretation of a confidence interval.
- State and check the Random, 10%, and Normal conditions for constructing a confidence interval for a population proportion.
- Determine the critical value for calculating a C% confidence interval for a population proportion using a table or technology.
- Determine the sample size required to obtain a C% confidence interval for a population proportion with a specified margin of error.
- Identify an appropriate point estimator and calculate the value of a point estimate for a difference in two population proportions.
- Construct a confidence interval for a difference in two population proportions.
- Interpret a confidence interval for a difference in two population proportion in context.

- State appropriate hypotheses for a significance test about a population proportion.
- Interpret a p-value in context.
- Make an appropriate conclusion for a significance test.
- Interpret a Type I error and a Type II error in context. Give a consequence of each error in a given setting.
- Calculate the standardized test statistic and p-value for a test about a population proportion.
- Perform a significance test about a population proportion.

Assessment Evidence

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Unit 8- Inference for Quantitative Data: Means

A. Confidence Interval for Mean (z and t procedures
B. Hypothesis Test for Mean(z and t procedures)
C. Confidence Interval for Difference in Means
D. Hypothesis Test for Difference in Means
E. Matched Pair t-procedures

Enduring Understandings

1. Given that variation may be random or not, conclusions are uncertain.(VAR-1)
2. The t-distribution may be used to model variation. (VAR-7)
3. An interval of values should be used to estimate parameters in order to account for uncertainty. (UNC-4)
4. Significance testing allows us to make decisions about hypotheses within a particular context. (DAT-3)

Learning Targets- I can...

- Describe the *t*-distributions.
- Identify an appropriate confidence interval procedure for a population mean, including the mean difference in matched pairs.
- State and check the Random, 10%, and Normal/ Large Sample conditions for constructing a confidence interval for a population mean, including the mean difference in matched pairs.
- Determine the critical value for calculating a C% confidence interval for a population mean using a table or technology.
- Determine the margin of error for a given sample size for a one-sample t-interval.
- Construct and interpret a confidence interval for a population mean, including mean difference in matched pairs.
- Construct and interpret a confidence interval for a difference in population means.
- Determine the sample size required to obtain a C% confidence interval for a population mean with a specified margin

of error.

- Calculate the standardized test statistic and p-value for a test about a population mean, including mean difference in matched pairs.
- Perform a significance test about a population mean, including mean difference in matched pairs.
- Interpret the power of a significance test and describe what factors affect the power of a test.
- Calculate the standardized test statistic and p-value for a test for a difference in two population means.
- Perform a significance test for a difference in two population means.

Assessment Evidence

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Unit 9 - Inference for Categorical Data: Chi-Square

A. Test for Goodness of Fit
B. Inference for 2-Way tables

Enduring Understandings

1. Given that variation may be random or not, conclusions are uncertain. (VAR-1)
2. The chi-square distribution may be used to model variation. (VAR-8)
3. Significance testing allows us to make decisions about hypotheses within a particular context. (DAT-3)

Learning Targets- I can...

- State appropriate hypotheses and compute the expected counts and chi-square test statistic for a chi-square test for goodness of fit.
- Calculate the degrees of freedom and P-value for a chi-square test for goodness of fit.
- State and check the Random, 10%, and Large Counts conditions for performing a chi-square test for goodness of fit.
- Perform a chi-square test for goodness of fit.
- Conduct a follow-up analysis when the results of a chi-square test are statistically significant.
- State appropriate hypotheses and compute the expected counts and chi-square test statistic for a chi-square test based on data in a two-way table.
- State and check the Random, 10%, and Large Counts conditions for a chi-square test based on data in a two-way table.
- Calculate the degrees of freedom and P-value for a chi-square test based on data in a two-way table.
- Perform a chi-square test for homogeneity.
- Perform a chi-square test for independence.
- Choose the appropriate chi-square test in a given setting.

Assessment Evidence	
Performance Assessment Options *May include, but are not limited to the following:* ● Formative and Summative Assessments ● AP Exam Problems	**Other assessment options** *May include, but are not limited to the following:* ● Projects
Digital Tools & Supplementary Resources	
TI-83/84 Calculator/ AP Classroom Resources/Statistical Applets	

Unit 10 - Inference for Quantitative Data: Slope	
Enduring Understandings	
1. Given that variation may be random or not, conclusions are uncertain. (VAR-1) 2. An interval of values should be used to estimate parameters in order to account for uncertainty. (UNC-4) 3. The *t*-distribution may be used to model variation.(VAR-7) 4. Significance testing allows us to make decisions about hypotheses within a particular context. (DAT-3)	
Learning Targets- I can...	
● Identify and interpret parameters and statistics for linear regression. ● Determine values of statistics from computer outputs. ● Check conditions for inference for a slope. ● Construct and interpret a confidence interval for the slope of the population (true) regression line. ● Perform a significance test about the slope of the population (true) regression line.	
Assessment Evidence	
Performance Assessment Options *May include, but are not limited to the following:* ● Formative and Summative Assessments ● AP Exam Problems	**Other assessment options** *May include, but are not limited to the following:* ● Projects
Digital Tools & Supplementary Resources	
TI-83/84 Calculator/ AP Classroom Resources/Statistical Applets	