AP Prob and Stats

September 2022

Content	Skills	Learning Targets	Assessment	Resources & Technology

CEQ:
   *How do we effectively interpret
   information from graphical and
   numerical displays and summaries?
   *How do we efficiently and
   effectively collect data ?
   *How does probability and the use of
   random variables aid in inference?
   *With what confidence can
   conclusions be made when working
   with statistics?
 	
UEQ:
 ● *How do we display and describe distributions with graphs and numbers?*
 ● *What is a five-number summary and what*
	A. Exploring Data
	
	A1. Display and interpret a distribution using bar graphs, pie charts, and dot plots.
	A2. Create and examine a two-way table to determine marginal distributions
	A3. Create and examine a two-way table to determine conditional distributions
	A4. Interpret graphical displays in terms of shape, center, spread, gaps, and outliers.
	A5. Create and interpret
		A1. LT I can create and get information from bar graphs, pie charts, and dot plots.
		
		A2. LT I can create and use a two-way table to determine marginal distributions.
		
		A3. LT I can create and examine a two-way table to determine conditional distributions.
			CA: A1-A7 Chapter 1 Test	The Practice of Statistics, 5th ed. (W.H. Freeman, publisher)

does it tell us about our data? ● *How does a linear transformation affect a data set?* ● *How is categorical data organized and explored using a two-way table?* **A. Exploring Data** A1. Graphical Displays A2. Marginal Distributions A3. Conditional Distributions A4. Numerical Descriptions A5. Stemplots & Histogram A6. Numerical Summaries A7. Boxplots *UEQ:* ● *How do we use standardized z-scores to determine percentiles?*	stemplots and histrograms. A6. Interpret and compare the mean, median, quartiles, five-number summary, interquartile range, standard deviation, range, and variance. A7. Create and interpret boxplots. **B. Measures of Relative Standing** B1. Find and interpret percentiles. B2. Find and interpret a z-score. B3. Describe the effect of a linear transformation on a data set. **C. Density Curves** C1. Draw and examine density curves.	**A4. LT** I can describe a distribution using shape, center, spread, gaps, and outliers. **A5. LT** I can create and interpret stemplots and histograms. **A6. LT** I can find the mean, five number summary, IQR, range, standard deviation, and variance of a set of numbers and create **A7. LT** I can create and interpret boxplots. **B1. LT** I can find and interpret percentiles. **B2. LT** I can find and describe a z -score. **B3. LT** I can describe the effect of a linear transformation on a data set. **C1. LT** I can draw and gather information from a	**CA: B1-B2, C1-C2, D1-D4, E1-E4 Chapter 2 Test** 🗐	

● *What is a density curve?* ● *What is the Normal distribution and what does it tell us?* ● *How do we determine if a distribution is Normal?* **B. Measures of Relative Standing** B1. Percentiles B2. Z-Scores B3. Data Transformation **C. Density Curves** C1. Definition of a Density Curve C2. Mean and Median **D. Normal Distributions** D1. Normal Distribution D2. 68-95-99.7 Rule D3. Finding Probability D4. Finding Values **E. Assessing Normality**	C2. Compare and contrast the mean and median of density curves. **D. Normal Distributions** D1. Discover the characteristics of a normal distribution. D2. Apply and analyze the 68-95-99.7 Rule. D3. Convert data to a standard normal, use the standard normal table, and find probability. D4. Use a given percentile to find a z-score and then find the value in context. **E. Assessing Normality** E1. Examine data using a histogram or stemplot to determine normality. E2. Construct and analyze a normal probability plot to determine normality.	density curve. **C2. LT** I can determine symmetry and skewdness of a density curve by comparing mean and median. **D1. LT** I can recognize the characteristics of a normal curve. **D2. LT** I can apply the 68-95-99.7 rule for a normal curve to make statements about data that are normally distributed. **D3. LT** I can convert data to a standard score and use the standard normal table to look up probabilities. **D4. LT** I can use a given percentile to find a z-score and then find the value in context. **E1. LT** I can examine a histogram and/or stemplot to determine the normality of data. **E2. LT** I can construct and		

E1. Histograms or Stemplots E2. Normal Probability Plot		examine a normal probability plot to determine if a set of data is normal.		

October

Content	Skills	Learning Targets	Assessment	Resources & Technology

CEQ:
  *How do we effectively interpret
  information from graphical and
  numerical displays and summaries?
  *How do
we effieciently and
  effectively collect data ?
  *How does probability and the use of
  random variables aid in inference?
  *With what confidence can
  conclusions be made when working
  with statistics?
 	
  UEQ:
	F. Scatterplots
	F1. Construct scatterplots using response and explanatory variables
	F2. Describe a scatterplot using the overall pattern, striking deviations, direction, form, strength, and outliers.
		F1. LT I can make a scatterplot using response and explnatory variables.
		
		F2. LT I can describe a scatter plot to examine the overall pattern, striking deviations, direction, form, strength, and outliers.		

● *What does a scatterplot tell us?* ● *How do we interpret the correlation between two variables and what does it tell us?* ● *What is the meaning of the least squares regression line?* ● *How do we determine the quality of regression line?* **F. Scatterplots** F1. Scattplots F2. Interpreting Scatterplots **G. Correlation** G1. Linear Association **H. Least-Squares Regression** H1. Regression Lines H2. Least-Squares Regression H3. Residuals H4. Coefficient of Determination **I. Correlation and Regression** **Decisions**	**G. Correlation** G1. Find and interpret the correlation of a set of data. **H. Least-Squares Regression** H1. Find the least squares regression line and use it to make predictions. H2. Interpret the least-squares regression line. H3. Determine the effectiveness of a regression line using residuals and a residual plot. H4. Find and interpret the coefficient of determination. **I. Correlation and Regression Decisions** I1. Find, interpret, and compare and contrast outliers and influential points.	**G1. LT** I can find and interpret the correlation for a set of data. **H1. LT** I can find the least squares regression line and make predictions with it **H2. LT** I can interpret the least squares regression line in context. **H3. LT** I can determine interpret a residual plot to determine the effectiveness of a regression line. **H4. LT** I can find and interpret in context the coefficient of determination. **I1. LT** I can find along with compare and contrast outlies and influential points.	**CA: F1-F2, G1, H1-H4, I1-I2 Chapter 3 Test**	

I1. Outliers and Influential Points				

November

Content	Skills	Learning Targets	Assessment	Resources & Technology

CEQ:
*How do we effectively interpret information from graphical and numerical displays and summaries?
*How do we effieciently and effectively collect data ?
*How does probability and the use of random variables aid in inference?
*With what confidence can conclusions be made when working with statistics?
 	
UEQ:
● *What are the differences between an observational study and an experiment?*
● *How is a truly random sample obtained?*
● *How is an effective experiment designed?*
 	
    J. Designing Samples
  J1. Sampling
  J2. Bias
 	
    K. Designing Experiments
	J. Designing Samples
	J1. Identify and describe the different types of sampling
	J2. Examine surveys for bias and describe the type of bias present
		J1. LT I can identify and describe the different types of sampling.
		
		J2. LT I can examine surveys for bias and describe the type of bias present.
			CA; J1-J3, K1-K6, L1-L2 Chapter 4 Test	

K1. Observational Study K2. Experimental Design K3. Randomization K4. Blocking K5. Random Numbers K6. Ethical Studies *UEQ:* ● *How are simulation methods used to estimate probability?* ● *How are probabilities assigned to a sample space?* ● *How are the rules of probability used to study random phenomenon?* **M. Simulation** M1. Random Number Table M2. Technology Based Generators **N. Probability Models** N1. Sample Space N2. Probability Assignment **O. Probability Rules**	K. Designing Experiments K1. Compare the advantages and disadvantages of an observational study and an experiment K2. Explain the 3 basic principles of experimental design K3. Describe a completely randomized design K4. Ouline a blocked experiment K5. Produce a random sample using a table of random digits and a calculator K6. Determine whether a statistical study has been carried out in an ethical manner **L. Causation** L1. Examine explanatory and lurking variables to determine if	**K1. LT** I can distinguish the difference between an observational study and an experiment and give the advantages and disadvantages of each. **K2. LT** I can identify the 3 basic principles of experimental design. **K3. LT I can d**escribe a completely randomized design. **K4. LT** I can outline an experiment using blocking **K5. LT** I can produce a random sample using a table of random digits and a calculator. **K6. LT** I can determine whether or not a statistical study has been carried out in an ethical manner. **L1. LT** I can examine	**CA: M1-M2, N1-N2, O1-O3 Chapter 5 Test**	

O1. Union O2. Intersection O3. Complement	they are confounded L2. Explain the best evidence for determining causation	explanatory and lurking variables to determine if they are confounding varaibles. **L2. LT** I can explain the best evidence for determining causation is a well designed experiment.		

UEQ:
 	
● *How are discrete and continuous random variables used in determining probability?*
● How do the mean and variance of discrete random variables help describe a distribution?
● *What conditions are required for a binomial distribution and for a geometric distribution?*
● *How is the binomial distribution used to determine probability?*
● *How is the geometric distribution used to determine probability?*   P.
Random Variables
 	
        P1. Discrete
        P2. Continuous
        P3. Normal Distribution
 	
        Q. Means and Variances
        Q1. Mean
	M. Simulation
	M1. Assign numbers
	and find a random
	sample using a random
	number table
	M2. Assign numbers
	and find a random
	sample using graphing
	calculator
	
	N. Probability Models
	N1. Find and describe
	the sample space
	N2. Determine how to
	assign probabilities to a
	sample space including
	using a tree diagram,
	 venn diagrams, and the
	multiplication principle
		M1. LT I can assign
		numbers and find a
		random sample using a
		random number table.
		
		M2. LT I can assign
		numbers and find a
		random sample using
		graphing calculator.
		
		N1. LT I can find and
		describe the sample
		space.
		
		N2. LT I can determine
		how to assign
		probabilities to a
			**CA: P1-P3, Q1-Q5,
			R1-R6, S1-S4
			Chapter 6 Test**	

Q2. Variance Q3. Rules for Means Q4. Rules for Variances Q5. Combining Normal Random Variables **R. Binomial** R1. Binomial Probability R2. Probability Distribution Function R3.Cumulative Distribution Function R4. Mean and Standard Deviation R5. Normal Approximation R6. Simulation **S. Geometric** S1. Geometric Probability S2. Probability and Cumulative Distribution Functions S3. Mean and Standard Deviation S4. Simulation	**O. Probability Rules** O1. Determine if events are mutually exclusive and apply the appropriate addition rule O2. Determine if events are independent and apply the appropriate multiplication rule O3. Explain the complement rule and apply it when appropriate **P. Random Variables** P1. Find the probability of discrete random variables and create and interpret probability histograms P2. Find the probability of continuous random variables and create and interpret density curves P3. Find probabilities using the normal curve	sample space including using a tree diagram, venn diagrams, and the multiplication principle. **O1. LT** I can determine if events are mutually exclusive and apply the appropriate addition rule. **O2. LT** I can determine if events are independent and apply the appropriate multiplication rule. **O3. LT** I can explain the complement rule and apply it when appropriate. **P1. LT** I can find the probability of discrete random variables and create and interpret probability histograms. **P2. LT** I can find the

Q. Means and Variances
Q1. Find and interpret the mean of a discrete random variable
Q2. Find and interpret the variance of a discrete random variable
Q3. Apply the rules for means
Q4. Apply the rules for variances
Q5. Find and interpret the probability of combined normal random variables

R. Binomial
R1. Recognize the binomial distribution in different settings and find the appropriate probability
R2. Apply the binomial probability distribution function to find

probability of continuous random variables and create and interpret density curves.

P3. LT I can find probabilities using the standard normal curve.

Q1. LT I can find and interpret the mean of a discrete random variable.

Q2. LT I can find and interpret the variance of a discrete random variable.

Q3. LT I can apply the rules for means.

Q4. LT I can apply the rules for variances.

Q5. LT I can find and interpret the probability of combined normal random variables.

R1.LT I can recognize

appropriate
probabilities
R3. Apply the binomial
cumulative distribution
function to find
appropriate
probabilities
R4. Find the mean and
standard deviation of a
binomial distribution
R5. Apply the nomal
approximation to a
binomial to find
probabilities
R6. Perform binomial
simulations to
approximate probability

S. Geometric
S1. Recognize the
geometric distribution
in different settings and
find the appropriate
probability
S2. Apply the geometric
probability and
cumulative distribution
functions to find
appropriate

the binomial
distribution in different
settings and find the
appropriate probability.

R2. LT I can apply the
binomial probability
distribution function to
find appropriate
probabilities.

R3. LT I can apply the
binomial cumulative
distribution function to
find appropriate
probabilities.

R4. LT I can find the
mean and standard
deviation of a binomial
distribution.

R5. LT I can apply the
normal approximation
to a binomial to find
probabilities.

R6. LT I can perform
binomial simulations to
approximate
probability.

S1. LT I can recognize
the geometric

	probabilities S3. Find the mean of a geometric distribution	distribution in different settings and find the appropriate probability. **S2. LT** I can apply the geometric probability and cumulative distribution functions to find appropriate probabilities. **S3. LT** I can find the mean of a geometric distribution.		

December 2014

Content	Skills	Learning Targets	Assessment	Resources & Technology
CEQ: *How do we effectively interpret information from graphical and numerical displays and summaries? *How do we efficiently and effectively collect data ? *How does probability and the use of random variables aid in inference? *With what confidence can conclusions be made when working with statistics? *UEQ:* ● *How is bias and variability determined in a sampling distribution?* ● *How is a normal approximation used to solve problems involving sample proportions?* ● *How is a normal approximation used to solve problems involving the sample mean?* ● *What is the significance of the Central Limit Theorem?* **T. Sampling Distribution** T1. Parameters and Statistics T2. Definition T3. Bias and Variability **U. Population Proportion**	**T. Sampling Distribution** T1. Define and give examples of parameters and statistics and explain the difference between the two T2. Define a sampling distribution T3. Examine bias and variability **U. Population Proportion**	**T1. LT** I can define and give examples of parameters and statistics and explain the difference between the two. **T2. LT** I can define a sampling distribution. **T3. LT** I can find and examine high/low variability and bias within a distribution. **U1. LT** I can describe the shape, center, and spread of a sample proportion.		

U1. Shape, Center, Spread U2. Mean and Standard Deviation U3. Normal Approximation **V. Sample Means** V1. Shape, Center, Spread V2. Mean and Standard Deviation V3. Central Limit *Theorem* *UEQ:* ● *What is statistical inference?* ● *How are confidence intervals created and interpreted?* ● *What is the the t-distribution and when is it appropriate to use it*? **W.Confidence Intervals** W1. Inference W2. Confidence Levels W3. Sample Size **X. Estimating a Population Mean** X1. Conditions for Inference X2. Standard Error X3. Intervals with Sigma Unknown X4. Paired t Procedures X5. t Procedures	U1. Describe the shape, center, and spread of a sample proportion U2. Find the mean and standard deviation of a sample proportion U3. Apply the normal approximation to a sample proportion and ensure the rules of thumb are met **V. Sample Means** V1. Describe the shape, center, and spread of a sample mean V2. Find the mean and standard deviation of a sample mean V3. Apply the normal approximation to a sample mean when the conditions are met including the significance of the central limit theorem	**U2. LT** I can find the mean and standard deviation of a sample proportion. **U3.LT** I can apply the normal approximation to a sample proportion and ensure the rules of thumb are met. **V1. LT** I can describe the shape, center, and spread of a sample mean. **V2.. LT** I can find the mean and standard deviation of a sample mean . **V3. LT** I can apply the normal approximation to a sample mean when the conditions are met including the significance of the central limit theorem.	**CA: T1-T3, U1-U3, V1-V3 Chapter 7 Test**	

Y. Estimating a Population Proportion Y1. Conditions Y2. Confidence Interval Y3. Sample Size *UEQ:* ● *What is hypothesis testing and how is it important in statistics?* ● *Why are the words "fail to reject" used when testing a claim?* ● *How are procedures different when testing one parameter vs. two parameters*? **Z. Significance Tests** Z1. Null & Alternate Hypothesis Z2. Statistical Significance **AA. Errors** AA1. Type 1 and Significance AA2. Type 2 and Power **BB. Performing Significance Tests** BB1. Tests about the Mean	**W. Confidence Intervals** W1. Explain how probability is used in statistical inference W2. Interpret a confidence interval W3. Determine the sample size needed when certain conditions are given **X. Estimating a Population Mean** X1. Identify the conditions for creating a confidence interval for a population mean X2. Know and apply the concept of standard error X3. Create and interpret confidence intervals when sigma is unknown X4. Create and interpret confidence intervals with dependent data X5. Identify the	**W1. LT** I can explain how probability is used in statistical inference. **W2. LT** I can find and Interpret a confidence interval. **W3. LT** I can determine the sample size needed for a given margin of error when working with population means . **X1. LT** I can identify the conditions for creating a confidence interval for a population mean. **X2. LT** I can apply the concept of standard error. **X3. LT** I can create and interpret confidence intervals when sigma is unknown. **X4. LT** I can create and interpret confidence intervals with dependent	**CA: W1-W3, X1-X5, Y1-Y3 Chapter 8 Test**	

BB2. Tests about a proportion **CC. Significance Tests with 2 Parameters** CC1. Comparing 2 Means CC2. Comparing 2 Proportions	conditions for using t procedures **Y. Estimating a Population Proportion** Y1. Identify the conditions for creating a confidence interval for a population proportion Y2. Create and interpret confidence intervals on a population proportion Y3. Determine the sample size needed when certain conditions are given **Z. Significance Tests** Z1. Identify and establish null and alternate hypothesis Z2. Understand what is meant by statistical significance	data. **X5. LT** I can identify the conditions for using t procedures. **Y1. LT** I can identify the conditions for creating a confidence interval for a population proportion. **Y2. LT** I can create and interpret confidence intervals on a population proportion. **Y3. LT** I can determine the sample size needed for a given margin of error when working with population proportions **Z1. LT** I can identify and establish null and alternate hypothesis. **Z2. LT** I understand what is meant by statistical significance. **AA1. LT** I know and understand what a type I error is in context.	**CA: Z1-Z2, AA1-AA2, BB1-BB2, Chapter 9 Test** **CC1-CC2 Chapter 10 Test**	

AA. Errors
AA1. Know and understand what a type I error is in context
AA2. Know and understand what a type II error is in context

BB. Performing Significance Tests
BB1. Set up and perform tests about the mean and analyze the results in context
BB2. Set up and perform tests about a proportion and analyze the results in context

CC. Significance Tests with 2 Parameters
CC1. Set up and perform tests about 2 means and analyze the results in context
CC2. Set up and perform tests about 2 proportions and analyze the results in context

AA2. LT I know and understand what a type II error is in context

BB1. LT I can set up and perform tests about the mean and analyze the results in context.

BB2. LT I can set up and perform tests about a proportion and analyze the results in context.

CC1. LT I can set up and perform tests about 2 means and analyze the results in context.

CC2. LT I can set up and perform tests about 2 proportions and analyze the results in context.