Section 1: Exploring Data

The following maps the videos in this section to the Texas Essential Knowledge and Skills for Mathematics TAC §111.47(c).

1.01 Introduction to Statistics

1.02 Statistics and Parameters

- Statistics (2)(D)

1.03 Categorical and Quantiative Data

- Statistics (4)(A)

Note: Unless stated otherwise, any sample data is fictitious and used solely for the purpose of instruction.

1.01

Introduction to Statistics

Statistics – the science of the collection, classification, analysis, and interpretation of data

Why learn statistics?

- To make inferences (i.e., draw conclusions) about a large population based on information contained within a small random sample
- To learn how to correctly interpret what is presented by the media in the news, , journals, print, etc.

The study of statistics is typically divided into ***descriptive statistics*** and ***inferential statistics.***

Descriptive statistics – organizes and summarizes data

Data – systematic recorded information on a single variable or multiple variables

Inferential statistics – is used to make informed conclusions about populations

The two main topics we will discuss in inferential statistics are hypothesis testing and confidence intervals.

Identify the appropriate branch of statistics in the following situations:

1. In the 2016–2017 season, the Texas Longhorns men's basketball team averaged 67 points per game.

   A. Descriptive Statistics
   B. Inferential Statistics

2. Suppose that out of 100 randomly selected males born in 2008 in the United States, 10 were named Edward. Thus, 10% of all males born in the United States in 2008 are named Edward.

   A. Descriptive Statistics
   B. Inferential Statistics

1.02

Statistics and Parameters

Parameter – a numeric value that summarizes a population

- Typically an unknown value
- Fixed value

Statistic – a numeric value that summarizes a sample

- Varies by sample
- Is used to estimate and make inferences about parameters

	Mean	Proportion	Standard Deviation	Variance
Parameter				
Statistic				

1. What does a ***mean*** describe?

2. When are ***proportions*** used?

3. What do the ***standard deviation*** and ***variance*** measure?

4. A standard can of soda contains 12 ounces. Due to the precision of the machinery that fills cans of soda, the amount of soda varies by a standard deviation of 0.1 ounces. Suppose a quality-control engineer randomly samples 100 cans of soda and determines their average weight is 12.3 ounces with a standard deviation of 0.12 ounces.

   i. Identify the population of interest.

   ii. Identify the sample.

   iii. Identify the variable of interest.

   iv. Identify the parameter of interest.

   v. Identify the statistic of interest.

5. We want to estimate the proportion of United States citizens who plan to vote in the next presidential election. Suppose the results of a recent survey of 1,000 United States citizens is shown below.

Will vote in the next presidential election	600
Will ***not*** vote in the next presidential election	400

i. Identify the population of interest.

ii. Identify the sample.

iii. Identify the variable of interest.

iv. Identify the parameter of interest.

v. Identify the statistic of interest.

1.03

Categorical and Quantitative Data

Data – systematic recorded information

Data is classified into two main groups:

1**. _____** ***(or qualitative)*** – Data described with the use of categories or words

Display this type of data using frequency tables, bar charts, and pie charts
Examples: a student's major, a person's favorite brand of clothes

2. _____ ***(or numeric)***– Data described with the use of numbers

- Display this type of data using histograms, stem and leaf plots, and box plots
- Used to describe the center, shape, and spread of data

Examples: time to complete a test, distance a person travels, a person's height in inches, the number of classes a student takes

Quantitative data is divided into two subcategories:

- _____ has a countable or finite number of outcomes.
  Examples: number of classes a student takes or number of pens in a classmate's school bag
- _____has an infinite number of values within an interval.
  Examples: time a person travels to a destination, distance a person travels to a destination, weight of a person

1. Suppose you randomly sample 100 students and record the following variables. Label each variable as either categorical, quantitative – discrete, or quantitative – continuous.

Type	Variables	Measurement
	Age	Years
	Student's class year	Freshman Sophomore Junior Senior
	Amount of money spent per student at the dining hall	Dollars

Classify each variable as categorical, quantitative – discrete, or quantitative – continuous. Justify your answer.

2. The length of time it takes for a sinus-relief medicine to have an effect

   A. Categorical
   B. Quantitative – discrete
   C. Quantitative – continuous

3. The number of raisins in a cookie

   A. Categorical
   B. Quantitative – discrete
   C. Quantitative – continuous

4. The overall satisfaction rating (1 through 5) of an overnight hotel stay

   A. Categorical
   B. Quantitative – discrete
   C. Quantitative – continuous