

Ch. 1 Statistics, Data, and Statistical Thinking

1.1 The Science of Statistics

1 Define Statistics

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 1) Which of the following is not the job of a statistician?
 - A) implementing new procedures based on the results of a study
 - B) determining what information is relevant in a given problem
 - C) collecting numerical information in the form of data
 - D) determining whether the conclusions drawn from a study are to be trusted

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 2) What is statistics?

1.2 Types of Statistical Applications

1 Define Descriptive and Inferential Statistics

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 1) A recent report stated "Based on a sample of 200 truck drivers, there is evidence to indicate that, on average, independent truck drivers earn more than company-hired truck drivers." Does this statement describe descriptive or inferential statistics?
 - A) inferential statistics
 - B) descriptive statistics
- 2) A survey of high school teenagers reported that 77% of those sampled are interested in pursuing a college education. Does this statement describe descriptive or inferential statistics?
 - A) descriptive statistics
 - B) inferential statistics
- 3) The average age of the students in a statistics class is 22 years. Does this statement describe descriptive or inferential statistics?
 - A) descriptive statistics
 - B) inferential statistics
- 4) From past figures, it is predicted that 23% of the registered voters will vote in the March primary. Does this statement describe descriptive or inferential statistics?
 - A) inferential statistics
 - B) descriptive statistics

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 5) In a survey of 5000 high school students, 19% of those surveyed read at least one best-seller each month. Give an example of a descriptive statement and an inferential statement that could be made based on this information.

- 3) An assembly line is operating satisfactorily if fewer than 2% of the phones produced per day are defective. To check the quality of a day's production, the company randomly samples 60 phones from a day's production to test for defects. Define the population of interest to the manufacturer.
- A) all the phones produced during the day in question
 - B) the 60 phones sampled and tested
 - C) the 60 responses: defective or not defective
 - D) the 2% of the phones that are defective
- 4) An insurance company conducted a study to determine the percentage of cardiologists who had been sued for malpractice in the previous nine years. The sample was randomly chosen from a national directory of doctors. What is the variable of interest in this study?
- A) the responses: have been sued/have not been sued for malpractice in the last nine years
 - B) the doctor's area of expertise (i.e., cardiology, pediatrics, etc.)
 - C) the number of doctors who are cardiologists
 - D) all cardiologists in the directory
- 5) A study published in 2007 attempted to estimate the proportion of Florida residents who were willing to spend more tax dollars on protecting the Florida coastline from environmental disasters. Thirty-six hundred Florida residents were surveyed. Which of the following is the population used in the study?
- A) all Florida residents
 - B) the 3600 Florida residents who were surveyed
 - C) Florida residents willing to spend more tax dollars protecting the coastline from environmental disasters
 - D) all Florida residents who lived along the coastline
- 6) A study published in 2007 attempted to estimate the proportion of Florida residents who were willing to spend more tax dollars on protecting the Florida beaches from environmental disasters. Thirty-seven hundred Florida residents were surveyed. Which of the following describes the variable of interest in the study?
- A) the response to the question, "Are you willing to spend more tax dollars on protecting the Florida beaches from environmental disasters?"
 - B) the response to the question "Do you live along the beach?"
 - C) the response to the question "Do you use the beach?"
 - D) the 3700 Florida residents surveyed
- 7) Which of the following is not typically an element of inferential statistical problems?
- A) census
 - B) sample
 - C) variable of interest
 - D) measure of reliability

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 8) Parking at a university has become a problem. University administrators are interested in determining the average time it takes a student to find a parking spot. An administrator inconspicuously followed 230 students and recorded how long it took each of them to find a parking spot. Identify the population, sample, and variable of interest to the administrators.

- 5) What method of data collection would you use to collect data for a study where a political pollster wishes to determine if his candidate is leading in the polls?
- A) survey
B) published source
C) designed experiment
D) observational study

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 6) What is meant by a *representative sample*?
- 7) What is the most common way to satisfy the representative sample requirement?
- 8) Three female students and two male students are to be chosen from a group of 30 female students and 20 male students. Does this sample of five students satisfy the conditions to be a random sample of the 50 students in the group? Explain.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

- 9) In an observational study, the researcher exerts strict control over the units in the study.
- A) True
B) False
- 10) When using data from a published source, it is not important to know how the data were collected and whether randomization was used.
- A) True
B) False

1.6 The Role of Statistics in Critical Thinking

1 Identify Bias

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

- 1) Define statistical thinking.
- 2) What is meant by selection bias?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 3) Which type of problem has occurred when inaccuracies exist in the values of the data recorded?
- A) measurement error
B) nonresponse bias
C) selection bias
- 4) A watchdog group is investigating how people are treated during the foreclosure process. Surveys were mailed to a random sample of 300 people who had recently been threatened with foreclosure. 75 of the surveys were returned by the postal service because the intended recipients had moved and left no forwarding address. What type of problem has occurred?
- A) nonresponse bias
B) selection bias
C) measurement error

Ch. 1 Statistics, Data, and Statistical Thinking

Answer Key

1.1 The Science of Statistics

1 Define Statistics

- 1) A
- 2) Statistics is the science of data that involves collecting, classifying, summarizing, organizing, analyzing, and interpreting numerical information.

1.2 Types of Statistical Applications

1 Define Descriptive and Inferential Statistics

- 1) A
- 2) A
- 3) A
- 4) A
- 5) Descriptive: 19% of the students sampled (or 950) read at least one best-seller each month.

Inferential: Based on the survey, we estimate that about 19% of all high school students read at least one best-seller each month.

- 6) A
- 7) A
- 8) A

1.3 Fundamental Elements of Statistics

1 Identify Elements of Statistics

- 1) A
- 2) A
- 3) A
- 4) A
- 5) A
- 6) A
- 7) A
- 8) The population of interest are all students at the university who park. The sample is the parking times of the 230 students that were collected by the university administrator. The variable of interest to the administrators is the parking time variable.
- 9) The variable of interest to the researcher is the failure rate of the copiers.
- 10) The population of interest to the guidance counselor is all community colleges in the United States. The variable of interest is the annual tuition cost of the community college.
- 11) When a census is used, there should be no error.
- 12) B
- 13) A
- 14) A
- 15) A
- 16) B

1.4 Types of Data

1 Classify Data as Quantitative or Qualitative

- 1) A
- 2) A
- 3) A
- 4) A
- 5) A
- 6) A
- 7) Qualitative; The numbers are arbitrarily selected numerical codes for the categories and have no utility beyond that.

1.5 Collecting Data

1 Identify Data Collection Method

- 1) A

- 2) A
- 3) A
- 4) A
- 5) A
- 6) a sample that exhibits characteristics typical of those possessed by the population of interest
- 7) selecting a random sample
- 8) No; not every sample of 5 students from the group has an equal chance of selection; for example, a sample consisting of 5 males has no chance of being selected.
- 9) B
- 10) B

1.6 The Role of Statistics in Critical Thinking

1 Identify Bias

- 1) Statistical thinking involves applying rational thought and the science of statistics to critically assess data and make inferences.
- 2) Selection bias is when a subset of the experimental units in the population is excluded so that these units have no possibility of being selected in the sample.
- 3) A
- 4) A
- 5) A
- 6) A
- 7) A
- 8) A

2 Unethical Statistics

- 1) Researchers select a biased sample, with the intention of misleading the public.
- 2) Answers may vary. One possible answer is that the past studies show that the ingredients only have possible cancer reducing effects on many, not all, types of cancer.
- 3) A