

Business Statistics: Communicating with Numbers, 3e (Jaggia)
Chapter 1 Statistics and Data

1) A knowledge of statistics provides the necessary tools to differentiate between sound and questionable conclusions.

Answer: TRUE

Explanation: To make intelligent decisions we all have to understand statistics—the language of data.

Difficulty: 1 Easy

Topic: The Relevance of Statistics

Learning Objective: 01-01 Describe the importance of statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

2) Statistics is the methodology of extracting unnecessary information from a data set.

Answer: FALSE

Explanation: Statistics is the methodology of extracting useful information from a data set.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

3) The branch of statistical studies called *descriptive statistics* summarizes important aspects of a data set.

Answer: TRUE

Explanation: Descriptive statistics refers to the summary of important aspects of a data set.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

4) The branch of statistical studies called *inferential statistics* refers to drawing conclusions about sample data by analyzing the corresponding population.

Answer: FALSE

Explanation: Inferential statistics refers to drawing conclusions about a population from analyzing sample data.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

5) A population is a larger data set than its corresponding sample.

Answer: TRUE

Explanation: A population is defined as all members of a specified group. A sample is a representative subset of the population.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

6) Population parameters are used to estimate corresponding sample statistics.

Answer: FALSE

Explanation: Sample statistics are used to estimate the corresponding population parameter.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

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7) Typically, it is possible to examine every member of the population.

Answer: FALSE

Explanation: Typically, it is too expensive, too time-consuming, or even impossible to examine every member of the population.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

8) Cross-sectional data contain values of a characteristic of one subject collected over time.

Answer: FALSE

Explanation: Cross-sectional data contain values of a characteristic of many subjects at the same point or approximately the same point in time, or without regards to differences in time.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

9) Time series data contain values of a characteristic of a subject over time.

Answer: TRUE

Explanation: Time series can include hourly, daily, weekly, monthly, quarterly, or annual observations.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

10) Structured data tends to include numbers, dates, and groups of words and numbers called strings.

Answer: TRUE

Explanation: Structure data generally refers to data that has a well-defined length and format. This type of data is not open to interpretation.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

11) Unstructured data conforms to a predefined row-column format.

Answer: TRUE

Explanation: Unstructured data does not conform to a predefined row-column format. Examples include be textual like email and multimedia content like photos or videos.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

12) Big data is a catchphrase that implies a complete set of population data.

Answer: TRUE

Explanation: Big data is a massive volume of data that is extremely difficult to manage, but it does not necessarily imply complete (population) data.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

13) A qualitative variable assumes meaningful numerical values.

Answer: FALSE

Explanation: A quantitative variable assumes meaningful numerical values, while values of a qualitative variable are typically described in labels or names.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

14) Both discrete and continuous variables may assume an uncountable number of values.

Answer: FALSE

Explanation: A discrete variable assumes a countable number of values because these values can be put in a sequence x_1, x_2, x_3 , and so on. Even if this sequence is infinite, its values can be counted as the first, the second, the third one, and so on. On the other hand, a continuous variable assumes any value from an interval, and such values cannot be counted (there are too many of them).

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

15) A discrete variable cannot assume an infinite number of values.

Answer: FALSE

Explanation: The number of obtained heads when a fair coin is tossed an infinite number of times may potentially assume any distinct integer value. An upper bound on this number does not exist. Since it is only distinct integer values, though, that is what makes it discrete instead of continuous.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

16) A continuous variable assumes any value from an interval (or collection of intervals).

Answer: TRUE

Explanation: A continuous variable is characterized by infinitely uncountable values and can take any value within an interval.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

17) A professor's gender (male, female) as well as rank (assistant, associate, full) represent ordinal data.

Answer: FALSE

Explanation: Professor's gender is nominal and rank is ordinal. The categories for nominal data do not have any natural ordering, while such an ordering exists for ordinal data.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

18) A professor's rank (assistant, associate, and full), as well as salary, represent ordinal data.

Answer: FALSE

Explanation: Professor's rank is ordinal but the salary is ratio. A quantitative data with ratio scale of measurement has a meaningful zero point, and hence all ratio values are naturally interpretable.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

19) Many people believe that statistics has no use in real life.

Answer: FALSE

Explanation: In order to make intelligent decisions in a world of uncertainty, we all have to understand statistics.

Difficulty: 1 Easy

Topic: The Relevance of Statistics

Learning Objective: 01-01 Describe the importance of statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

20) The weather forecast cannot be based on only the weather for the last three days.

Answer: TRUE

Explanation: Weather forecast is based on a lot of data collected over years.

Difficulty: 2 Medium

Topic: The Relevance of Statistics

Learning Objective: 01-01 Describe the importance of statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

21) Data and data interpretation do not show up in every facet of life.

Answer: FALSE

Explanation: Data and data interpretation show up in virtually every facet of life.

Difficulty: 1 Easy

Topic: The Relevance of Statistics

Learning Objective: 01-01 Describe the importance of statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

22) A population is defined as all possible subjects of a specific group.

Answer: TRUE

Explanation: A population is defined as all members of a specific group (not necessarily people).

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

23) Researchers use sample results in an attempt to estimate an unknown population statistic.

Answer: FALSE

Explanation: Researchers use sample results in an attempt to estimate an unknown population parameter.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

24) The recorded body temperature of patients in the group of patients under research study is an example of time series data.

Answer: FALSE

Explanation: The recorded body temperature of patients in the group of patients under research study is an example of cross-sectional data.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

25) Body weight is an example of a discrete variable.

Answer: FALSE

Explanation: Body weight is a continuous variable. A continuous variable assumes any value from an interval, and such values cannot be counted (there are too many of them).

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

26) The mathematical operation of addition can be performed on nominal data.

Answer: FALSE

Explanation: The only thing we can do with nominal data is to categorize or group the data.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

27) A ZIP code is an example of quantitative data.

Answer: FALSE

Explanation: ZIP code is an example of qualitative data. It is an observation of where the person/entity lives, but it is not something that is measured.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

28) Ordinal scale reflects a stronger level of measurement than the nominal scale.

Answer: TRUE

Explanation: With ordinal data we are able both to categorize and rank the data with respect to some characteristic.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

29) All mathematical operations can be performed on ratio-scaled data.

Answer: TRUE

Explanation: Arithmetic operations are valid on ratio-scaled data.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

30) A respondent to a survey indicates that she drives a Nissan Pathfinder. This is an example of qualitative data.

Answer: TRUE

Explanation: The car's model can only be categorized. Labels or names can be used to identify the distinguishing characteristics of an observation.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

31) The zero point of an interval scale reflects a complete absence of what is being measured.

Answer: FALSE

Explanation: The zero point of an interval scale does not reflect a complete absence of what is being measured; the value of zero is arbitrary chosen.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

32) Nominal and interval scales are used for qualitative variables.

Answer: FALSE

Explanation: An interval scale is used for quantitative variables, and the nominal scale is used for qualitative variables.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 33) The study of statistics can be defined as
- A) the language of data.
 - B) the art and science of getting information from data.
 - C) the study of collecting, analyzing, presenting, and interpreting data.
 - D) All of these choices are correct.

Answer: D

Explanation: Statistics are used as a language of data, tools for getting information from data, and the study of collecting, analyzing, presenting, and interpreting data.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 34) When reading published statistics (numerical facts), you should
- A) never believe what you read, because all statistics are lies.
 - B) only believe those statistics that are adequately supported.
 - C) believe what you read, because they wouldn't be published if they weren't correct.
 - D) only believe those statistics that are presented in so-called quality publications.

Answer: B

Explanation: Often, published statistics are presented in a way that is biased. The authors attempt to use statistics to support their position. Valid statistics are only those that are adequately supported.

Difficulty: 2 Medium

Topic: The Relevance of Statistics

Learning Objective: 01-01 Describe the importance of statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

35) The two branches of the study of statistics are generally referred to as

- A) descriptive and inferential statistics.
- B) inferential and differential statistics.
- C) descriptive and referential statistics.
- D) differential and descriptive statistics.

Answer: A

Explanation: The two branches of statistics are descriptive and inferential statistics.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

36) Population parameters are difficult to calculate due to

- A) cost prohibitions on data collection.
- B) the infeasibility of collecting data on the entire population.
- C) the fact that samples are difficult to draw due to the nature of the data.
- D) both cost prohibitions on data collection and the infeasibility of collecting data on the entire population.

Answer: D

Explanation: Gathering population data can be very expensive and difficult if not impossible to obtain.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

37) The teachers' union in California wants to know the average salary for high school teachers throughout the country. What is the teachers' union presumably planning to calculate?

- A) Sample statistic
- B) Sample parameter
- C) Population statistic
- D) Population parameter

Answer: A

Explanation: The teachers' union in California should be considered as a sample, and a sample statistic will be calculated.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

38) A population consists of

- A) all items of interest in a sample.
- B) a subject of interest in a sample.
- C) all items of interest in a statistical problem.
- D) a subject of interest in a statistical problem.

Answer: C

Explanation: A population is defined as all members of a specified group under study.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 39) In inferential statistics, we calculate statistics of sample data to
- A) estimate unknown population parameters.
 - B) conduct tests about unknown population parameters.
 - C) Both of these choices are correct.
 - D) Neither of these choices is correct.

Answer: C

Explanation: Inferential statistics is concerned with estimating unknown population parameters and testing hypotheses about them.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 40) Which of the following represents a population and a sample from that population?
- A) Residents of Albany, New York, and registered voters in Albany, New York
 - B) Teachers of a high school and members of the parent-teacher group
 - C) Fans at a concert who purchase T-shirts, and fans at a concert who purchase soda
 - D) Freshmen at St. Joseph's University and basketball players at St. Joseph's University

Answer: A

Explanation: The registered voters in Albany are clearly a subset of the residents of Albany.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 41) Which of the following represents a population and a sample from that population?
- A) Attendees at a sporting event, and those who purchased popcorn at said sporting event
 - B) Full-time employees at a marketing firm, and temporary summer interns at the marketing firm
 - C) Seniors at Boston College and students in a first-semester business statistics course
 - D) Stocks available on the NYSE and stocks on the NASDAQ

Answer: A

Explanation: Those individuals who purchase popcorn at said sporting event are clearly a subset of all attendees at a given sporting event.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 42) Which of the following is an example of cross-sectional data?
- A) GDP of the United States from 1990–2010
 - B) Daily price of DuPont stock during the first quarter
 - C) Quarterly housing starts collected over the last 60 years
 - D) Results of market research testing consumer preferences for soda

Answer: D

Explanation: Cross-sectional data refers to data collected by recording a characteristic of many subjects at the same point in time, or without regard to differences in time.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 43) Which of the following is an example of time series data?
- A) The sale prices of townhouses sold last year
 - B) Quarterly housing starts collected over the last 60 years
 - C) Results of market research testing consumer preferences for soda
 - D) Starting salaries of recent business graduates at Penn State University

Answer: B

Explanation: Time series data refers to data collected by recording a characteristic of a subject over several time periods.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 44) The estimation of which of the following requires sampling?
- A) U.S. unemployment rate
 - B) Total rainfall in Phoenix, Arizona, in 2010
 - C) The Cleveland Indians' hitting percentage in 2010
 - D) The average SAT score of incoming freshmen at a university

Answer: A

Explanation: It is impossible to gather complete data on the unemployed population of the U.S. Not everyone that is unemployed files for unemployment benefits.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

- 45) A company wants to estimate the mean price of oil over the past 10 years. What kind of data does the company need?
- A) Time series data
 - B) Inferential statistics
 - C) Cross-sectional data
 - D) Descriptive statistics

Answer: A

Explanation: Time series data refers to data collected by recording a characteristic of a subject over several time periods.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

46) For which of the following population parameters is sampling not necessary?

- A) The average height of NBA players
- B) The average life of light bulbs produced by a manufacturer
- C) The average content of cereal boxes produced by a manufacturer
- D) The percentage of the U.S. public school teachers who support Democrats

Answer: A

Explanation: For all other populations, it is very impractical to collect all data. The heights are readily available for all NBA players.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

47) Sampling is used heavily in manufacturing and service settings to ensure high-quality products. In which of the following areas would sampling be inappropriate?

- A) Computer assembly
- B) Custom cabinet making
- C) Cell phone manufacturing
- D) Technical support by phone

Answer: B

Explanation: Custom cabinets are not meant to be standardized in their characteristics. Therefore, sampling would make no sense. The ratio scale has a meaningful zero point and we can interpret ratios of values. In this case, the linebacker would have no tackles.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

- 48) Which of the following are examples of cross-sectional data?
- A) The test scores of students in a class
 - B) The current average prices of regular gasoline in different states
 - C) The sales prices of single-family homes sold last month in California
 - D) All of these choices are correct.

Answer: D

Explanation: Cross-sectional data refers to data collected by recording a characteristic of many subjects at the same point in time, or without regard to differences in time.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 49) An analyst studies a data set of the year-end book value per share for all companies listed on the New York Stock Exchange. This data set is *best* described as
- A) time series data.
 - B) cross-sectional data.
 - C) neither time series nor cross-sectional data.
 - D) a combination of time series and cross-sectional data.

Answer: B

Explanation: Cross-sectional data refers to data collected by recording a characteristic of many subjects without regard to differences in time.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

- 50) Which type of data, cross-sectional versus time series, is more important to research?
- A) Neither type of data is important.
 - B) Cross-sectional data is more important than time series data.
 - C) Time series data is more important than cross-sectional data.
 - D) Time series data and cross-sectional data are equally as valuable in different types of research.

Answer: D

Explanation: Sample data are generally collected in one of two ways, as cross-sectional data or time series data, both equally important.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 51) Which of the following variables is qualitative?
- A) Height
 - B) Gender
 - C) Weight
 - D) Temperature

Answer: B

Explanation: Values corresponding to a qualitative variable are typically expressed in words.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 52) Which of the following variables is quantitative?
- A) Gender
 - B) Temperature
 - C) Marital status
 - D) Religious affiliation

Answer: B

Explanation: A quantitative variable assumes meaningful numerical values.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

53) Which of the following is a quantitative variable?

- A) House age
- B) House size
- C) House price
- D) All of these choices are correct.

Answer: D

Explanation: A quantitative variable assumes meaningful numerical values.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

54) San Francisco 49ers' linebacker Patrick Willis won the Defensive Rookie of the Year Award in 2007 with a total of 174 tackles. Tackles are measured on what kind of a scale? Is a variable measuring the number of tackles considered continuous or discrete?

- A) Ratio scale; discrete
- B) Interval scale; discrete
- C) Ratio scale; continuous
- D) Interval scale; continuous

Answer: A

Explanation: A discrete variable takes on individually distinct values. The ratio scale has a meaningful zero point and we can interpret ratios of values. In this case, the linebacker would have no tackles.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 55) Which of the following variables is not continuous?
- A) Height of NBA players
 - B) Time of a flight between Atlanta and Chicago
 - C) Average temperature in the month of July in Orlando
 - D) The number of obtained heads when a fair coin is tossed 20 times

Answer: D

Explanation: Although in practice the exact values of such variables as height, time, and temperature are approximated, they are continuous in nature. If a fair coin is tossed 20 times, the possible numbers of obtained heads are 0, 1, 2, ..., 20.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 56) The ordinal scale of data measurement is
- A) less sophisticated than the nominal scale.
 - B) more sophisticated than the interval scale.
 - C) more sophisticated than the nominal scale.
 - D) as equally sophisticated as the nominal scale.

Answer: C

Explanation: Compared to nominal scale, the ordinal scale reflects a stronger level of measurement. The order of the four scales is nominal, ordinal, interval, and ratio.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

57) The interval scale of data measurement is

- A) less sophisticated than the ratio scale.
- B) more sophisticated than the ratio scale.
- C) less sophisticated than the ordinal scale.
- D) equally sophisticated as the ratio scale because both are appropriate for quantitative data.

Answer: A

Explanation: The ratio scale represents the strongest level of measurement. The order of the four scales is nominal, ordinal, interval, and ratio.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

58) A recent survey of 200 small firms (annual revenue less than \$10 million) asked whether an increase in the minimum wage would cause the firm to decrease capital spending. Possible responses to the survey question were: "Yes," "No," or "Don't Know." This data is *best* classified as

- A) ratio scale.
- B) ordinal scale.
- C) interval scale.
- D) nominal scale.

Answer: D

Explanation: With nominal data all we can do is categorize or group the data.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

59) Which scale of data measurement is appropriate for the names of companies listed on the Dow Jones Industrial Average?

- A) Ratio scale
- B) Ordinal scale
- C) Interval scale
- D) Nominal scale

Answer: D

Explanation: There is not any natural ordering of the names of these 30 companies and the names are not something that is measured.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

60) An analyst collects data on the weekly closing price of gold throughout a year. The scale of this data is

- A) ratio scale.
- B) ordinal scale.
- C) interval scale.
- D) nominal scale.

Answer: A

Explanation: The scale for weekly closing price of gold is ratio.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

61) An undergraduate student's status (freshman, sophomore, junior, or senior) is an example of which scale of measurement?

- A) Ratio scale
- B) Ordinal scale
- C) Interval scale
- D) Nominal scale

Answer: B

Explanation: Undergraduate students are classified into the four categories based on the number of credit hours earned. There is a natural ordering between the four categories; sophomores have more credit hours than freshmen, and so on.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

62) The Fahrenheit scale for measuring temperature would be classified as a(n)

- A) ratio scale.
- B) ordinal scale.
- C) interval scale.
- D) nominal scale.

Answer: C

Explanation: Zero in Fahrenheit degrees does not mean "no temperature." We cannot say, for example, that today is twice as warm as six months ago, which characterizes the ratio scale.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

63) At the end of a semester college students evaluate their instructors by assigning them to one of the following categories: Excellent, Good, Average, Below Average, and Poor. The measurement scale is a(n)

- A) ratio scale.
- B) ordinal scale.
- C) interval scale.
- D) nominal scale.

Answer: B

Explanation: A standard way to record the ratings is to use ordinal scale.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

64) What is the scale of measurement of the distance between any two locations?

- A) Ratio scale
- B) Ordinal scale
- C) Interval scale
- D) Nominal scale

Answer: A

Explanation: Because zero is meaningful, the distance between two locations is an example of ratio scale.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

65) Which scales of data measurement are associated with quantitative data?

- A) Interval and ratio
- B) Ratio and nominal
- C) Ordinal and interval
- D) Nominal and ordinal

Answer: A

Explanation: Two scales are associated with quantitative data: interval scale and ratio scale.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

66) Which data scales of measurement are associated with qualitative data?

- A) Interval and ratio
- B) Ratio and nominal
- C) Ordinal and interval
- D) Nominal and ordinal

Answer: D

Explanation: Two scales are associated with qualitative data: nominal scale and ordinal scale.

Difficulty: 1 Easy

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

67) The data represents the stock price for Google at the end of the past four quarters. Which of the following types of data best describe these values?

- A) Cross-sectional
- B) Nominal
- C) Time series
- D) Ordinal

Answer: C

Explanation: Time series data refers to data collected by recording a characteristic of a subject over several time periods.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

68) Your business statistics class had a test last week. The average score for the class is an example of

- A) secondary data
- B) qualitative data
- C) descriptive statistics
- D) inferential statistics

Answer: C

Explanation: Descriptive statistics refers to summarizing a set of data.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

69) A sample statistic is an estimate of

- A) population parameter.
- B) population statistic.
- C) sample parameter.
- D) descriptive statistic.

Answer: A

Explanation: Population parameter is estimated by sample statistic.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

70) A _____ represents all possible subjects of interest.

- A) sample
- B) population
- C) statistic
- D) parameter

Answer: B

Explanation: A population consists of the complete collection of items with the characteristic we want to understand.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

71) A major portion of _____ is concerned with the problem of estimating population parameters or testing hypothesis about such parameters.

- A) descriptive statistics
- B) population statistics
- C) inferential statistics
- D) business statistics

Answer: C

Explanation: Inferential statistics refers to extracting useful information from a sample to draw a conclusion about a population.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 72) Data that describe a characteristic about a sample is known as a
- A) population.
 - B) survey.
 - C) parameter.
 - D) statistic.

Answer: D

Explanation: A statistic is taken from any sample drawn from the larger population.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 73) When a characteristic of interest differs among various observations, then it can be termed a
- A) parameter.
 - B) variable.
 - C) data.
 - D) information.

Answer: B

Explanation: A variable is the general characteristic being observed on a set of people, objects, or events, where each observation varies in kind or degree.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

74) A(n) _____ variable is characterized by infinitely uncountable values and can take any value within interval.

- A) discrete
- B) infinite
- C) continuous
- D) quantitative

Answer: C

Explanation: A continuous variable can take on any value within an interval, while a discrete variable assumes a countable number of distinct values.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

75) Differences between categories are meaningless with _____ data.

- A) ordinal
- B) interval
- C) ratio
- D) continuous

Answer: A

Explanation: The differences between the ranked values are meaningless for ordinal scale data.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

76) Which of the following scales represents the strongest level of measurement?

- A) Ordinal
- B) Nominal
- C) Ratio
- D) Interval

Answer: C

Explanation: The ratio scale represents the strongest level of measurement.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

77) Which of the following scales represents the least sophisticated level of measurement?

- A) Ordinal
- B) Nominal
- C) Ratio
- D) Interval

Answer: B

Explanation: The nominal scale represents the less sophisticated level of measurement.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

78) The values of data on a(n) _____ scale can be categorized and ranked.

- A) ordinal
- B) nominal
- C) ratio
- D) interval

Answer: A

Explanation: The ordinal scale data can be categorized and ranked.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

79) Which of the following characteristics does the interval scale not have?

- A) Values can be categorized.
- B) Values can be ranked.
- C) There is a true zero point.
- D) The differences between values are valid.

Answer: C

Explanation: Only ratio scale data have a true zero point.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

80) Which of the following is an example of quantitative data?

- A) The ZIP code of your home address
- B) Google's closing stock price today
- C) Your gender
- D) Your Social Security number

Answer: B

Explanation: Google's closing stock price is quantitative data.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

81) Which of the following is an example of qualitative data?

- A) Today's high temperature
- B) The class average of last test
- C) The amount of time you spent for your homework
- D) Your last name

Answer: D

Explanation: We cannot calculate summary measures if the variable is qualitative in nature.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

82) A respondent of a survey is asked whether the Philadelphia Flyers' performance in the last game was excellent, good, fair, or poor. The person indicates that the performance was "good."

This is an example of

- A) nominal data
- B) ordinal data
- C) interval data
- D) ratio data

Answer: B

Explanation: The ordinal scale data can be categorized and ranked.

Difficulty: 2 Medium

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

83) Philadelphia experienced a record amount of rainfall in August. During the last week of the month, the city received additional rain from a hurricane. Because global warming is thought to cause extreme weather patterns, one conclusion that could be drawn is that these patterns are evidence of global warming. What is wrong with this conclusion?

Answer: The existence or nonexistence of climate change cannot be based on one month's worth of data. We must instead look at long-term trends.

Explanation: A knowledge of statistics provides the necessary tools to differentiate between sound statistical conclusions and questionable conclusions drawn from an insufficient number of data points.

Difficulty: 2 Medium

Topic: The Relevance of Statistics

Learning Objective: 01-01 Describe the importance of statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

84) Administrators have concluded that the SAT exam results for 2011 show a distinct change in student capabilities when compared with the year 1991. In 1991 the SAT exam included only multiple choice sections and was later redesigned. What is wrong with this conclusion?

Answer: The redesign of the exam makes any conclusions comparing 1991 to 2011 invalid.

Explanation: A knowledge of statistics provides the necessary tools to differentiate between sound statistical conclusions and questionable conclusions drawn from an insufficient number of data points, "bad" data points, incomplete data points, etc.

Difficulty: 2 Medium

Topic: The Relevance of Statistics

Learning Objective: 01-01 Describe the importance of statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

85) A university is interested in tracking the success of its graduates by measuring the length of each graduate's job search before getting a position in his or her chosen field. How would you define the appropriate population?

Answer: The population should include all graduates of the university within a specified time period.

Explanation: A population consists of the complete collection of items with the characteristic we want to understand.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

86) We would like to determine whether there is a difference between the height of a college team of basketball players at the Ohio State University and the height of the overall student body. Identify the two populations in this study.

Answer: Varsity basketball players at OSU, all students at OSU

Explanation: A population consists of the complete collection of items with the characteristic we want to understand.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

87) In each of the following statements, determine whether the branch of statistics is best classified as descriptive statistics or inferential statistics.

- A. The average of a data set is equal to 35.7.
- B. The minimum value of a data set is 78, and the maximum value is 146.
- C. Because the average age in a sample is 23, it is likely that the average age in the population is about 23.
- D. Because the values in the sample are so widely dispersed, the spread of the population must be high.

Answer: Descriptive Statistics: The average of a data set is equal to 35.7 and the minimum value of a data set is 78, and the maximum value is 146. Inferential Statistics: Because the average age in a sample is 23, it is likely that the average age in the population is about 23, and because the values in the sample are so widely dispersed, the spread of the population must be high.

Explanation: Descriptive statistics refers to the summary of a data set, and inferential statistics refers to drawing conclusions about a population based on a sample.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-02 Differentiate between descriptive statistics and inferential statistics.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

88) A car company wants to know the average age of cars of their brand that are still on the road. How would you define the appropriate population? Will the car company calculate a population parameter or a sample statistic? Why?

Answer: The population includes all cars of their brand still on the road. The car company will calculate a sample statistic. It would be very costly to find the age of every car of their brand on the road.

Explanation: Obtaining information on the entire population is expensive.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

89) What are the primary reasons that sampling is necessary?

Answer: Gathering population data can sometimes be impossible, very time-consuming, or very expensive.

Explanation: We are unable to use population data for two main reasons: It is impossible to examine every member of the population and obtaining information on the entire population is expensive and time consuming.

Difficulty: 1 Easy

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

90) An investor wants to know today's average closing price of the stocks listed on the Standard and Poor's 500 Index. Will the investor calculate a population parameter or sample statistic? Why?

Answer: The investor will calculate a population parameter. It is easy to gather all the prices for the firms on the Standard and Poor's 500 Index.

Explanation: If the population under study is completely known, then all data can be used to obtain the population parameter.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

91) We would like to determine the average height of a college team of basketball players at Ohio State University. Is it necessary to take a sample of basketball players? Explain.

Answer: No, it is a small population and it is very easy to get the heights of the entire basketball team.

Explanation: If the population under study is small, we can use the entire population to obtain the desired parameter.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

92) We would like to determine the average height of the overall student body at Ohio State University. Does it seem necessary to take a sample from the overall student body?

Answer: Yes, it would be very difficult and expensive to collect the heights of so many students.

Explanation: Obtaining information on the entire population is expensive, impractical, and time consuming.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

93) Researchers are interested in completing a study examining trends in the sale of foods in the U.S. They have decided to examine the quantity of organic vegetables sold by supermarkets. Will researchers be able to gather population data?

Answer: No, population data would be very impractical and expensive to gather.

Explanation: Obtaining information on the entire population is expensive, impractical, and time consuming.

Difficulty: 2 Medium

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

94) Every 10 years, a census is taken in the U.S. by the Census Bureau. Despite the intent of gathering data on the population of the United States, issues exist that make true population data impossible to gather. Identify at least two issues in collecting these data.

Answer: Homeless population not surveyed, people providing intentionally false responses, illegal immigrants not wanting to be counted, no enforcement on returning completed survey, new homes being missed or demolished homes being counted, etc.

Explanation: Obtaining information on the entire population is expensive, impractical, and time consuming.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

95) Social networking sites support themselves in large part by selling advertising space. The hit rate on these ads is a critical measure when trying to solicit advertising. The hit rate is used as a measure of success for ads. How would you recommend a social networking site use sampling to evaluate its existing ads?

Answer: The existing ads should be split into categories of like products. Then some number of ads from each category could be selected for the sample to determine the average number of hits for the relevant category. Any other logical sampling methods are acceptable.

Explanation: We use sample data rather than population data to draw a conclusion about a population.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

96) The following table includes the number of white women over the age of 20 in the civilian labor force. Because it is time series data, what would the entries of the first column refer to?

?	Number in Civilian Labor Force
	43216
	43479
	44663
	45409
	45543
	46613
	47051
	47833
	48611
	49128
	48562

Source: <http://data.bls.gov>

Answer: Time measured in years, quarters, months, etc.

Explanation: Time series data refer to data collected by recording a characteristic of a subject over several time periods.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

97) A study of teen smoking is planned. Researchers are interested in collecting cross-sectional data, which allow them to draw conclusions about the likelihood, frequency, and longevity of teen smoking. You have been asked to design this study and will collect no more than five pieces of data. What information will you collect?

Answer: "What is your gender?" "What is your age?" "Do you smoke?" "How many cigarettes per day do you smoke?" "For how long have you smoked?" (Other reasonable answers are acceptable.)

Explanation: Cross-sectional data refer to data collected by recording characteristics at the same point in time.

Difficulty: 3 Hard

Topic: What Is Statistics?

Learning Objective: 01-03 Explain various data types.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

98) Define the measurement scale of a car's fuel efficiency (measured in miles per gallon). Is a car's fuel efficiency discrete or continuous?

Answer: Fuel efficiency is measured on a ratio scale. The number zero is meaningful. Fuel efficiency is a continuous variable.

Explanation: A continuous variable can take on any value within an interval. Ratio scale is the strongest level of measurement and it has a true zero point.

Difficulty: 3 Hard

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

99) A study of teen smoking is planned. Researchers are interested in collecting data which allow them to draw conclusions about the likelihood, frequency, and longevity of teen smoking. The questions asked include: "What is your gender?" "What is your age?" "Do you smoke (yes or no)?" "How many cigarettes per day do you smoke?" "For how long have you smoked (in years)?" What is the measurement scale for each variable?

Answer: Gender: nominal; Age: ratio; Smoking: nominal; Number of cigarettes per day: ratio; Time of smoking: ratio

Explanation: If we are presented with nominal data, all we can do is categorize or group the data. The values in the data set differ merely by name or label. With ordinal data, we are able to both categorize and rank the data with respect to some characteristic or trait. With data on an interval scale, not only can we categorize and rank the data, but we are also assured that the differences between scale values are meaningful. Ratio-scaled data have all the characteristics of interval-scaled data as well as a meaningful zero point, which allows us to interpret the ratios of values.

Difficulty: 3 Hard

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

100) The following data represent a sample of property sales in Cape May County during the year 2000. Identify the qualitative and quantitative variables. What are the natural categories for Town and Class? Identify the measurement scales for all variables.

Town	Class	Date	Price	Assessment
Avalon	Residential	12/28/2000	\$ 500,000	\$ 288,600
Avalon	Residential	04/14/2000	\$ 500,000	\$ 325,900
Wildwood	Commercial	05/01/2000	\$ 500,000	\$ 250,000
Avalon	Residential	05/22/2000	\$ 500,000	\$ 332,500
North Wildwood	Commercial	06/02/2000	\$ 500,000	\$ 607,700
Avalon	Residential	09/16/2000	\$ 518,000	\$ 269,900
North Wildwood	Residential	04/07/2000	\$ 520,000	\$ 373,100
Avalon	Commercial	01/15/2000	\$ 520,000	\$ 414,600
Avalon	Residential	01/15/2000	\$ 525,000	\$ 373,500
Wildwood	Residential	06/14/2000	\$ 525,000	\$ 379,600

Answer: Qualitative variables: Town, Class; Quantitative variables: Date, Price, Assessment
 Town categories: Avalon, Wildwood, and North Wildwood; Class categories: Residential and Commercial
 Nominal: Town and Class; Interval: Date; Ratio: Price and Assessment

Explanation: A variable whose values are described verbally is qualitative, while a variable that assumes meaningful numerical values is quantitative. The categories for qualitative nominal data do not have any natural ordering, while such an ordering is visible for qualitative ordinal data. A quantitative data with a ratio scale of measurement has a meaningful zero point, and hence all ratio values are naturally interpretable.

Difficulty: 3 Hard

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

101) The following data represent a sample of non-elementary mathematics teachers in Bergen County, New Jersey. Identify the qualitative and quantitative variables, the categories associated with each qualitative variable, and the measurement scales for all variables.

School	Degree	Years Experience	Salary	Classes Taught
Brookside E.S.	Masters	8	\$ 67,945	6
Program 3-Emotionally Distur.	Masters	25	\$ 82,910	4
Program 3-Emotionally Distur.	Bachelors	25	\$ 86,030	7
Program 3-Emotionally Distur.	Bachelors	3	\$ 62,690	5
Program 3-Emotionally Distur.	Masters	21	\$ 82,620	5
Program 5-Life Skills	Masters	11	\$ 82,330	5
Program 5-Life Skills	Masters	41	\$ 79,790	4
Bergen Academies-Hackensack	Masters	31	\$ 82,626	5
Bergen Academies-Hackensack	Masters	10	\$ 82,626	4
Bergen Academies-Hackensack	Masters	3	\$ 98,291	4

Source:

<http://php.app.com/edstaff/results2.php?county=BERGEN&district=%25&school=%25&lname=&fname=&job1=Math+Non-Elementary&Submit=Submit>

Answer: Qualitative: School, Degree; Quantitative: Years Experience, Salary, Classes Taught
 Categories for School: Brookside E.S., Program 3-Emotionally Distur., Program 5-Life Skills, and Berger Academies-Hackensack; Categories for Degree: Bachelors and Masters
 Nominal: School; Ordinal: Degree; Ratio: Years Experience, Classes Taught, and Salary

Explanation: A variable whose values are described verbally is qualitative, while a variable that assumes meaningful numerical values is quantitative. The categories for nominal data do not have any natural ordering, while such an ordering is visible for ordinal data. A quantitative data with a ratio scale of measurement has a meaningful zero point, and hence all ratio values are naturally interpretable.

Difficulty: 3 Hard

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation

102) The following data concern a sample of employees of the U.S. Marshalls in the state of New York. Identify the qualitative and quantitative variables, the categories associated with each qualitative variable, and the measurement scales for all variables.

Country	Station	Title	Grade	Salary
New York Country	NEW YORK- NY	MISCELLANEOUS CLERK AND ASSISTANT	GS 07	\$ 51,030
New York Country	NEW YORK- NY	MISCELLANEOUS CLERK AND ASSISTANT	GS 07	\$ 55,405
Kings Country	NEW YORK- KINGS	ACCOUNTING TECHNICIAN	GS 07	\$ 45,196
Erie Country	BUFFALO	ADMINISTRATIV E OFFICER	GS 13	\$ 95,023
Onondaga Country	SYRACUSE	BUDGET ANALYSIS	GS 09	\$ 53,773
New York Country	NEW YORK- NY	GENERAL BUSINESS AND INDUSTRY	GS 11	\$ 66,887
Onondaga Country	SYRACUSE	GENERAL BUSINESS AND INDUSTRY	GS 11	\$ 74,628
Erie Country	BUFFALO	MISCELLANEOUS ADMINISTRATIO N AND PROGRAM	GS 09	\$ 59,962
New York Country	NEW YORK- NY	MISCELLANEOUS ADMINISTRATIO N AND PROGRAM	GS 09	\$ 57,065
Kings Country	NEW YORK- KINGS	GENERAL BUSINESS AND INDUSTRY	GS 11	\$ 66,887

Source:

http://php.app.com/fed_employees10/results.php?fullname=&agency_name=U.S.+MARSHALS+SERVICE&statename=New+York&countyname=%25&Submit=Search

Answer: Qualitative: County, Station, Title, and Grade; Quantitative: Salary Categories for County: New York County, Kings County, Erie County, and Onondaga County; Categories for Station: NEW YORK - NY, NEW YORK - KINGS, BUFFALO, and SYRACUSE; Categories for Title: MISCELLANEOUS CLERK AND ASSISTANT, ACCOUNTING TECHNICIAN, ADMINISTRATIVE OFFICER, BUDGET ANALYSIS, GENERAL BUSINESS AND INDUSTRY, MISCELLANEOUS ADMINISTRATION AND PROGRAM Categories for Grade: GS 07, GS 13, GS 09, GS 11 Nominal: County, Station, and Title; Ordinal: Grade; Ratio: Salary

Explanation: A variable whose values are described verbally is qualitative, while a variable that assumes meaningful numerical values is quantitative. The categories for nominal data do not have any natural ordering, while such an ordering is visible for ordinal data. A quantitative data with a ratio scale of measurement has a meaningful zero point, and hence all ratio values are naturally interpretable.

Difficulty: 3 Hard

Topic: Variables and Scales of Measurement

Learning Objective: 01-04 Describe variables and types of measurement scales.

Bloom's: Apply

AACSB: Knowledge Application

Accessibility: Keyboard Navigation