

Business Statistics and Analytics in Practice, 9e (Bowerman)

Chapter 1 An Introduction to Business Statistics and Analytics

1) A population is a set that includes all elements about which we wish to draw a conclusion.

Answer: TRUE

Difficulty: 1 Easy

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-07 Describe the difference between a population and a sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

2) If we examine some of the population measurements, we are conducting a census of the population.

Answer: FALSE

Explanation: A census is defined as examining all of the population measurements.

Difficulty: 2 Medium

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-07 Describe the difference between a population and a sample.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

3) A random sample is selected so that every element in the population has the same chance of being included in the sample.

Answer: TRUE

Difficulty: 1 Easy

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

4) An example of a quantitative variable is the manufacturer of a car.

Answer: FALSE

Explanation: This is an example of a qualitative or categorical variable.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-02 Describe the difference between a quantitative variable and a qualitative variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

5) An example of a qualitative variable is the mileage of a car.

Answer: FALSE

Explanation: This is an example of a quantitative variable.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-02 Describe the difference between a quantitative variable and a qualitative variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

6) Statistical inference is the science of using a sample of measurements to make generalizations about the important aspects of a population of measurements.

Answer: TRUE

Difficulty: 2 Medium

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-08 Distinguish between descriptive statistics and statistical inference.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

7) Time series data are data collected at the same time period.

Answer: FALSE

Explanation: Time series data are collected over different time periods.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

8) Cross-sectional data are data collected at the same or approximately the same point in time.

Answer: TRUE

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

9) Daily high temperature in a local community collected over a 30-day time period is an example of cross-sectional data.

Answer: FALSE

Explanation: Cross-sectional data are collected at the same point in time. This is an example of time series data.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

10) The number of sick days taken by employees in 2008 for the top 10 technology companies is an example of time series data.

Answer: FALSE

Explanation: This is an example of cross-sectional data. Time series data are collected at different time periods.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

11) The number of sick days per month taken by employees for the last 10 years at Apex Co. is an example of time series data.

Answer: TRUE

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

12) A quantitative variable can also be referred to as a categorical variable.

Answer: FALSE

Explanation: Qualitative variables are also known as categorical variables.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-02 Describe the difference between a quantitative variable and a qualitative variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

13) In a data set of information on college business students, an example of an element is their cumulative GPA.

Answer: FALSE

Explanation: The college business students are the elements of the data set. The cumulative GPA is an example of a variable, which is a characteristic of an element (i.e., a college business student) in the data set.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-01 Define a variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

14) In an observational study, the variable of interest is called a response variable.

Answer: TRUE

Difficulty: 1 Easy

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

15) In an experimental study, the aim is to manipulate or set the value of the response variable.

Answer: FALSE

Explanation: In experimental studies, the aim is to manipulate the factor(s), which may be related to the response variable.

Difficulty: 2 Medium

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

16) The science of describing the important aspects of a set of measures is called statistical inference.

Answer: FALSE

Explanation: This is the definition of descriptive statistics. Statistical inference is the science of using a sample of measurements to make generalizations about the population of measurements.

Difficulty: 2 Medium

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-08 Distinguish between descriptive statistics and statistical inference.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

17) It is possible to use a random sample from a population to make statistical inferences about the entire population.

Answer: TRUE

Difficulty: 1 Easy

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-08 Distinguish between descriptive statistics and statistical inference.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

18) Processes produce outputs over time.

Answer: TRUE

Difficulty: 1 Easy

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

19) Selecting many different samples and running many different tests can eventually produce a result that makes a desired conclusion be true.

Answer: FALSE

Explanation: Using different samples and tests to produce a desired conclusion does not make the conclusion true.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Understand

AACSB: Analytical Thinking

Accessibility: Keyboard Navigation

20) Using a nonrandom sample procedure in order to support a desired conclusion is an example of an unethical statistical procedure.

Answer: TRUE

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Understand

AACSB: Analytical Thinking

Accessibility: Keyboard Navigation

21) An individual collecting data directly through planned experimentation is obtaining primary data.

Answer: TRUE

Difficulty: 1 Easy

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

22) Secondary data are data taken from an existing source.

Answer: TRUE

Difficulty: 1 Easy

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

23) Data warehousing is defined as a process of centralized data management and retrieval.

Answer: TRUE

Difficulty: 1 Easy

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-06 Explain the basic ideas of data warehousing and big data.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

24) The term *big data* refers to the use of survey data by big business.

Answer: FALSE

Explanation: *Big data* is a term that arose from the huge capacity of data warehouses that contain massive amounts of data.

Difficulty: 1 Easy

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-06 Explain the basic ideas of data warehousing and big data.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

25) In order to select a stratified random sample, we divide the population into overlapping groups of similar elements.

Answer: FALSE

Explanation: A stratified random sample is created by dividing the population into non-overlapping groups.

Difficulty: 2 Medium

Topic: Stratified Random, Cluster, and Systematic Sampling

Learning Objective: 01-12 Describe the basic ideas of stratified random, cluster, and systematic sampling.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

26) If we sample without replacement, we do not place the unit chosen on a particular selection back into the population.

Answer: TRUE

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

27) By taking a systematic sample in which we select every 100th shopper arriving at a specific store, we are approximating a random sample of shoppers.

Answer: TRUE

Difficulty: 2 Medium

Topic: Stratified Random, Cluster, and Systematic Sampling

Learning Objective: 01-12 Describe the basic ideas of stratified random, cluster, and systematic sampling.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

28) A common practice in selecting a sample from a large geographic area is multistage cluster sampling.

Answer: TRUE

Difficulty: 2 Medium

Topic: Stratified Random, Cluster, and Systematic Sampling

Learning Objective: 01-12 Describe the basic ideas of stratified random, cluster, and systematic sampling.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

29) Stratification can at times be combined with multistage cluster sampling to develop an appropriate sample.

Answer: TRUE

Difficulty: 2 Medium

Topic: Stratified Random, Cluster, and Systematic Sampling

Learning Objective: 01-12 Describe the basic ideas of stratified random, cluster, and systematic sampling.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

30) In systematic sampling, the first element is randomly selected from the first (N/n) elements.

Answer: TRUE

Difficulty: 3 Hard

Topic: Stratified Random, Cluster, and Systematic Sampling

Learning Objective: 01-12 Describe the basic ideas of stratified random, cluster, and systematic sampling.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

31) A sampling error can occur because of incomplete information.

Answer: TRUE

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

32) The target population is the result of sampling from the original population that is of interest to the researcher.

Answer: FALSE

Explanation: Target population is the entire population of interest.

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

33) Errors of non-observation occur when data values are recorded incorrectly.

Answer: FALSE

Explanation: Errors of non-observation relate to population elements that are not observed.

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

34) A recording error is an error of observation.

Answer: TRUE

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

35) A low response rate has no effect on the validity of a survey's findings.

Answer: FALSE

Explanation: Low response rates do affect the validity of a survey's results.

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

36) Sampling error occurs because a characteristic of a random sample may not exactly equal the population characteristic that we are attempting to estimate.

Answer: TRUE

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

37) Convenience sampling is a type of probability sampling in which we select elements to sample because we believe they have the highest probability of responding.

Answer: FALSE

Explanation: Convenience sampling is not probability sampling. Convenience sampling is a type of sampling in which we select elements because they are easy or convenient to sample.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

38) Judgment sampling is an example of convenience sampling.

Answer: FALSE

Explanation: Judgment sampling has an extremely knowledgeable individual select the sample. Voluntary sampling occurs when participants self-select, which is a form of convenience sampling, where elements are selected because they are easy or convenient to sample.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

39) Judgment sampling occurs when a person who is extremely knowledgeable about the population under consideration selects the population elements that they feel are most representative of the population.

Answer: TRUE

Difficulty: 1 Easy

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

40) Business analytics is a new field that does not use traditional statistics to analyze big data.

Answer: FALSE

Explanation: Business analytics is an extension of traditional statistics.

Difficulty: 2 Medium

Topic: Business Analytics and Data Mining

Learning Objective: 01-10 Explain some of the uses of business analytics and data mining.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

41) Prescriptive analytics involve methods used to find anomalies, patterns, and associations in data sets with the purpose of predicting future outcomes.

Answer: FALSE

Explanation: This is the definition of predictive analytics. Prescriptive analytics uses results from predictive analytics to recommend courses of action within the business.

Difficulty: 2 Medium

Topic: Business Analytics and Data Mining

Learning Objective: 01-10 Explain some of the uses of business analytics and data mining.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

42) A population that consists of all the customers who will use the drive-thru of the local fast food restaurant is called a(n) _____.

- A) infinite population
- B) random sample population
- C) statistical population
- D) finite population

Answer: D

Explanation: It is a finite population because only a finite number of customers will use the drive-thru. An infinite population would be defined as the theoretical potential number of customers.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

43) In _____ we select elements because they are easy to sample.

- A) random sampling
- B) convenience sampling
- C) judgment sampling
- D) probability sampling

Answer: B

Explanation: Random sampling, judgment sampling, and probability sampling are methods of sampling in which the selected elements may not be convenient to sample.

Difficulty: 1 Easy

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking
Accessibility: Keyboard Navigation

44) _____ sampling is where we know the chance that each element will be included in the sample, which allows us to make statistical inferences about the sample population.

- A) Convenience
- B) Voluntary
- C) Probability
- D) Judgment

Answer: C

Explanation: Convenience, voluntary, and judgment sampling should not be used to make valid statistical inferences about a population.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

45) Which of the following is not a method of numerical descriptive analytics?

- A) factor analysis
- B) cluster analysis
- C) bullet graphs
- D) association learning

Answer: C

Explanation: Bullet graphs are a method of graphical descriptive analytics.

Difficulty: 2 Medium

Topic: Business Analytics and Data Mining

Learning Objective: 01-10 Explain some of the uses of business analytics and data mining.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

46) _____ uses traditional or newer graphics to present visual summaries of business information.

- A) Nonparametric predictive analytics
- B) Parametric predictive analytics
- C) Prescriptive analytics
- D) Graphical descriptive analytics

Answer: D

Explanation: Predictive analytics (whether parametric or nonparametric) are methods used to predict values of a response variable on the basis of one or more predictor variables. Prescriptive analytics are techniques that combine external and internal constraints with results from descriptive or predictive analytics to recommend an optimal course of action.

Difficulty: 1 Easy

Topic: Business Analytics and Data Mining

Learning Objective: 01-10 Explain some of the uses of business analytics and data mining.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

47) Which of the following is not a supervised learning technique in predictive analytics?

- A) linear regression
- B) factor analysis
- C) decision trees
- D) neural networks

Answer: B

Explanation: Factor analysis is an unsupervised learning technique because there is no specific response variable involved, which is a requirement for a supervised learning technique.

Difficulty: 2 Medium

Topic: Business Analytics and Data Mining

Learning Objective: 01-10 Explain some of the uses of business analytics and data mining.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

48) Transactional data are now used by businesses as part of

- A) survey analysis.
- B) big data.
- C) descriptive statistics.
- D) experimental studies.

Answer: B

Explanation: By definition, big data are collected by business for effective decision making.

Difficulty: 2 Medium

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-06 Explain the basic ideas of data warehousing and big data.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

49) _____ consists of a set of concepts and techniques that are used to describe populations and samples and to make statistical inferences about populations by using samples.

- A) Traditional statistics
- B) Random sampling
- C) Data mining
- D) Time series analysis

Answer: A

Explanation: Definition of traditional statistics.

Difficulty: 1 Easy

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-08 Distinguish between descriptive statistics and statistical inference.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 50) When we are choosing a random sample and we do not place chosen units back into the population, we are
- A) sampling with replacement.
 - B) sampling without replacement.
 - C) using a systematic sample.
 - D) using a voluntary response sample.

Answer: B

Explanation: Sampling with replacement occurs when a selected element is replaced before another sample is taken; systematic and voluntary response samples are not random.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

- 51) Which of the following is a type of question used in survey research?

- A) dichotomous
- B) open-ended
- C) multiple-choice
- D) All of the other answers are correct.

Answer: D

Explanation: All three of the listed question types can be used in survey design.

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

52) Methods for obtaining a sample are called

- A) sample surveys.
- B) probability sampling.
- C) random sampling.
- D) sampling designs.

Answer: D

Explanation: Sample surveys are the result of sampling designs. Random sampling, stratified random sampling, cluster sampling, and systematic sampling are sampling designs which are types of probability sampling.

Difficulty: 2 Medium

Topic: Stratified Random, Cluster, and Systematic Sampling

Learning Objective: 01-12 Describe the basic ideas of stratified random, cluster, and systematic sampling.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

53) A _____ is a list of all the units in a population.

- A) sample
- B) frame
- C) census
- D) variable

Answer: B

Explanation: A sample can be only a part of a population; a census is the examination of the population and variable is a characteristic of an element of the population.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

54) Nonoverlapping groups of similar elements in a population are called

- A) clusters.
- B) frames.
- C) strata.
- D) stages.

Answer: C

Explanation: Strata are groups within a population sample which do not overlap.

Difficulty: 3 Hard

Topic: Stratified Random, Cluster, and Systematic Sampling

Learning Objective: 01-12 Describe the basic ideas of stratified random, cluster, and systematic sampling.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

55) A *Yes* or *No* question is _____.

- A) dichotomous
- B) evaluative
- C) open-ended
- D) systematic

Answer: A

Explanation: Dichotomous questions consist of only two possible responses.

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

56) _____ occurs when some population elements are excluded from the process of selecting the sample.

- A) Nonresponse
- B) Error of observation
- C) Undercoverage
- D) Sample frame

Answer: C

Explanation: Exclusion of population elements in selection is not a result of nonresponse or error of observation because this occurs during the survey itself. Sampling error is a result of the survey process.

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

57) _____ is the difference between a numerical descriptor of the population and the corresponding descriptor of the sample.

- A) Sampling error
- B) Nonobservation error
- C) Observation error
- D) Nonresponse

Answer: A

Explanation: Nonresponse, nonobservation and observation error occur during the survey process. Sampling error is a result of the survey process.

Difficulty: 2 Medium

Topic: More about Surveys and Errors in Survey Sampling

Learning Objective: 01-13 Describe basic types of survey questions, survey procedures, and sources of error.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

58) Data that are collected by an individual through personally planned experimentation or observation are _____.

- A) secondary data
- B) quantitative data
- C) primary data
- D) variables

Answer: C

Explanation: By definition, primary data are collected while secondary data are from an existing source.

Difficulty: 1 Easy

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

59) A ratio variable has the following characteristic.

- A) qualitative
- B) inherently defined zero value
- C) categorical in nature
- D) predictable

Answer: B

Explanation: By definition, ratio variables are quantitative and have an absolute zero value.

Difficulty: 1 Easy

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

60) Which of the following is a quantitative variable?

- A) the manufacturer of a cell phone
- B) a person's gender
- C) mileage of a car
- D) whether a person is a college graduate
- E) whether a person has a charge account

Answer: C

Explanation: A quantitative variable is measurable and noncategorical.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-02 Describe the difference between a quantitative variable and a qualitative variable.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

61) Which of the following is a categorical variable?

- A) air temperature
- B) bank account balance
- C) daily sales in a store
- D) whether a person has a traffic violation
- E) value of company stock

Answer: D

Explanation: A categorical variable is qualitative, not measured.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-02 Describe the difference between a quantitative variable and a qualitative variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

62) Measurements from a population are called

- A) elements.
- B) observations.
- C) variables.
- D) processes.

Answer: B

Explanation: By definition, elements are the members of the population and variables are characteristics of elements; a measurement (or observation) assigns a value to a variable for an element of the population. A process is a sequence of operations that takes inputs and turns them into outputs.

Difficulty: 2 Medium

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-07 Describe the difference between a population and a sample.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

63) The two types of quantitative variables are

- A) ordinal and ratio.
- B) interval and ordinal.
- C) nominative and ordinal.
- D) interval and ratio.
- E) nominative and interval.

Answer: D

Explanation: Nominative and ordinal are types of qualitative variables.

Difficulty: 2 Medium

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

64) Temperature (in degrees Fahrenheit) is an example of a(n) _____ variable.

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

Answer: C

Explanation: Temperature is quantitative (excludes nominative and ordinal), and the ratio of two temperatures is not meaningful.

Difficulty: 2 Medium

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

65) Jersey numbers of soccer players is an example of a(n) _____ variable.

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

Answer: A

Explanation: Interval and ratio are quantitative variables; jersey numbers have no logical order.

Difficulty: 2 Medium

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

66) The weight of a chemical compound used in an experiment that is obtained using a well-adjusted scale represents a(n) _____ level of measurement.

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

Answer: D

Explanation: Nominative and ordinal are qualitative variables; weight creates logical ratios: 60 lb is twice as heavy as 30 lb.

Difficulty: 2 Medium

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

67) An identification of police officers by rank would represent a(n) _____ level of measurement.

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

Answer: B

Explanation: Interval and ratio are quantitative variables, nominative is only a naming category, and police rank has order.

Difficulty: 2 Medium

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

68) _____ is a necessary component of a runs plot.

- A) Observation over time
- B) Qualitative variable
- C) Random sampling of the data
- D) Cross-sectional data

Answer: A

Explanation: A runs plot is a graphical display of time series data.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-04 Construct and interpret a time series (runs) plot.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

69) _____ is the science of using a sample to make generalizations about the important aspects of a population.

- A) Time series analysis
- B) Descriptive statistics
- C) Random sample
- D) Statistical inference

Answer: D

Explanation: By definition, a time series is a study of data over time; descriptive statistics is the study of the measurements of population variables; a random sample is a data set.

Difficulty: 1 Easy

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-08 Distinguish between descriptive statistics and statistical inference.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

70) College entrance exam scores, such as SAT scores, are an example of a(n) _____ variable.

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

Answer: D

Explanation: Nominative and ordinal are qualitative variables; college entrance exam scores have no meaningful ratio and no inherently defined zero value.

Difficulty: 3 Hard

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

71) The number of miles a truck is driven before it is overhauled is an example of a(n) _____ variable.

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

Answer: D

Explanation: Nominative and ordinal are qualitative variables; miles driven can have a meaningful ratio.

Difficulty: 2 Medium

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

72) A(n) _____ variable is a qualitative variable such that there is no meaningful ordering or ranking of the categories.

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

Answer: C

Explanation: Ratio and interval are quantitative variables; ordinal implies order or rank.

Difficulty: 1 Easy

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

73) A person's telephone area code is an example of a(n) _____ variable.

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

Answer: A

Explanation: This is a qualitative variable without order; therefore, a nominative variable.

Difficulty: 2 Medium

Topic: Ratio, Interval, Ordinal, and Nominative Scales of Measurement

Learning Objective: 01-11 Identify the ratio, interval, ordinal, and nominative scales of measurement.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

74) Any characteristic of a population unit is a(n)

- A) measurement.
- B) sample.
- C) observation.
- D) variable.

Answer: D

Explanation: Measurement and observation are methods attached to a variable; a sample is a subset of the units in a population.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-01 Define a variable.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

75) Examining all population measurements is called a _____.

- A) census
- B) frame
- C) sample
- D) variable

Answer: A

Explanation: By definition, a census looks at the entire population.

Difficulty: 2 Medium

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-07 Describe the difference between a population and a sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

76) Any characteristic of an element is called a _____.

- A) set
- B) process
- C) variable
- D) census

Answer: C

Explanation: A process is a sequence of operations; a census looks at the entire population; set is related to population.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-01 Define a variable.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

77) The process of assigning a value of a variable to each element in a data set is called _____.

- A) sampling
- B) measurement
- C) experimental analysis
- D) observational analysis

Answer: B

Explanation: By definition, sampling is taking a portion of the population to measure; experimental and observational analysis are methods of obtaining data.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-01 Define a variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

78) A _____ is a display of individual measurements versus time.

- A) runs plot
- B) statistical analysis
- C) random sample
- D) measurement

Answer: A

Explanation: A runs plot is a graphical display of data over time.

Difficulty: 1 Easy

Topic: Data

Learning Objective: 01-04 Construct and interpret a time series (runs) plot.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

79) Statistical _____ refers to using a sample of measurements and making generalizations about the important aspects of a population.

- A) sampling
- B) process
- C) analysis
- D) inference

Answer: D

Explanation: By definition, inference is taking a sample of data and its measurements and relating those measurements to the population as a whole.

Difficulty: 2 Medium

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-08 Distinguish between descriptive statistics and statistical inference.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

80) A _____ is a subset of the units in a population.

- A) census
- B) process
- C) sample
- D) variable

Answer: C

Explanation: By definition, a census looks at an entire population; a variable is a characteristic of an element within the population; a process is a sequence of operations that produces elements of a population.

Difficulty: 1 Easy

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-07 Describe the difference between a population and a sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

81) A _____ variable takes on values that are numbers on the real number line.

- A) qualitative
- B) quantitative
- C) categorical
- D) nominative

Answer: B

Explanation: Qualitative, categorical, and nominative variables are non-quantitative variables.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-02 Describe the difference between a quantitative variable and a qualitative variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

82) A sequence of operations that takes inputs and turns them into outputs is a _____.

- A) process
- B) statistical inference
- C) runs plot
- D) random sampling

Answer: A

Explanation: By definition, a runs plot is a graphical display; random sampling is a method of selecting a portion of a population; statistical inference is the science of using a sample of measurements to infer about the entire population.

Difficulty: 1 Easy

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Remember

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

83) A(n) _____ variable can have values that indicate into which of several categories of a population it belongs.

- A) qualitative
- B) quantitative
- C) ratio
- D) interval

Answer: A

Explanation: Quantitative, ratio, and interval all have similar definitions.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-02 Describe the difference between a quantitative variable and a qualitative variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

84) A set of all elements we wish to study is called a _____.

- A) sample
- B) process
- C) census
- D) population

Answer: D

Explanation: By definition, a census is the examination of all population measurements; a process is a sequence of operations; a sample is a subset of a population.

Difficulty: 2 Medium

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-07 Describe the difference between a population and a sample.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

85) _____ refers to describing the important aspects of a set of measurements.

- A) Cross-sectional analysis
- B) Runs plot
- C) Descriptive statistics
- D) Time series analysis

Answer: C

Explanation: A runs plot and time series analysis both look at data over time; cross-sectional analysis looks at data collected at the same point in time.

Difficulty: 2 Medium

Topic: Populations, Samples, and Traditional Statistics

Learning Objective: 01-08 Distinguish between descriptive statistics and statistical inference.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

86) The change in the daily price of a stock is what type of variable?

- A) qualitative
- B) ordinal
- C) random
- D) quantitative

Answer: D

Explanation: Qualitative and ordinal have similar definitions; random variables are all characteristics of a population element.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-02 Describe the difference between a quantitative variable and a qualitative variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

87) Data collected for a particular study are referred to as a data _____.

- A) variable
- B) measurement
- C) set
- D) element

Answer: C

Explanation: By definition, a variable is a characteristic of an element; a measurement assigns a value to a variable; an element is one unit of a population.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-01 Define a variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

88) A data set provides information about some group of individual _____.

- A) variables
- B) elements
- C) statistics
- D) measurements

Answer: B

Explanation: By definition, measurements assign values to a variable of an element; statistics is the science of describing aspects of a set of measurements; variables are characteristics of elements in a population.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-01 Define a variable.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

89) When the data being studied are gathered from a published source, this is referred to as a(n) _____.

- A) existing data source
- B) observational data source
- C) experimental data source
- D) cross-sectional data source

Answer: A

Explanation: By definition, an experimental data source is a collection of data where one is able to manipulate values; an observational data source is a collection of data where one is unable to control factors. Cross-sectional is not a defined data source but rather a way of analyzing or displaying the data that have been collected.

Difficulty: 2 Medium

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

90) One method of being sure a sample being studied can be used to make statistical inferences about the population is to select a

- A) judgment sample.
- B) voluntary response sample.
- C) convenience sample.
- D) probability sample.

Answer: D

Explanation: Runs plots are a way of looking at processes over time, which can then be used to make inferences about a population. Simply looking at descriptive statistics (of which, proportion and cross-sectional analysis are methods or procedures) is not sufficient to make inferences.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Apply

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

91) Which of the following is *not* an example of unethical statistical practices?

- A) inappropriate interpretation of statistical results
- B) using graphs to make statistical inferences
- C) improper sampling
- D) descriptive measures that mislead the user
- E) None of the other answers is correct.

Answer: B

Explanation: It is unethical to use methods or procedures designed to mislead the audience that is viewing the findings.

Difficulty: 2 Medium

Topic: Random Sampling and Three Case Studies That Illustrate Statistical Inference

Learning Objective: 01-09 Explain the concept of random sampling and select a random sample.

Bloom's: Understand

AACSB: Analytical Thinking

Accessibility: Keyboard Navigation

92) If we collect data on the number of wins each team in the NFL had during the 2011-12 season, we have _____ data.

- A) cross-sectional
- B) time series
- C) non-historical
- D) survey

Answer: A

Explanation: A time series is a collection of data taken over time, while a cross-section is a collection of data taken at the same point in time.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

93) If we collect data on the number of wins the Dallas Cowboys earned each of the past 10 years, we have _____ data.

- A) cross-sectional
- B) time series
- C) non-historical
- D) survey

Answer: B

Explanation: A time series is a collection of data taken over time, while a cross-section is a collection of data taken at the same point in time.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data.

Bloom's: Understand

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

94) A study is being conducted on the effect of gas price on the number of miles driven in a given month. Residents in two cities, one on the East Coast and one on the West Coast, are randomly selected and asked to complete a questionnaire on the type of car they drive, the number of miles they live from work, the number of children under 18 in their household, their monthly income, and the number of miles they have driven over the past 30 days. List the response variable(s).

Answer: The response variable in this study is the number of miles driven over the past 30 days.

Response variables are defined as the variable of interest in a study.

Difficulty: 2 Medium

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

Bloom's: Understand; Apply

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

95) A study is being conducted on the effect of gas price on the number of miles driven in a given month. Residents in two cities, one on the East Coast and one on the West Coast, are randomly selected and asked to complete a questionnaire on the type of car they drive, the number of miles they live from work, the number of children under 18 in their household, their monthly income, and the number of miles they have driven over the past 30 days. Is this an experimental or observational study?

Answer: Observational study

An observational study occurs when analysts are unable to control the factors of interest. An experimental study occurs when values of factors that are related to the variable of interest can be set or manipulated.

Difficulty: 2 Medium

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

Bloom's: Understand; Apply

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

96) A study is being conducted on the effect of gas price on the number of miles driven in a given month. Residents in two cities, one on the East Coast and one on the West Coast, are randomly selected and asked to complete a questionnaire on the type of car they drive, the number of miles they live from work, the number of children under 18 in their household, their monthly income, and the number of miles they have driven over the past 30 days. List the factor(s).

Answer: Factors in this study are location of residence, type of car, number of miles from work, number of children under 18, and monthly income.

Factors are related to the variable of interest.

Difficulty: 2 Medium

Topic: Data Sources, Data Warehousing, and Big Data

Learning Objective: 01-05 Identify the different types of data sources: existing data sources, experimental studies, and observational studies.

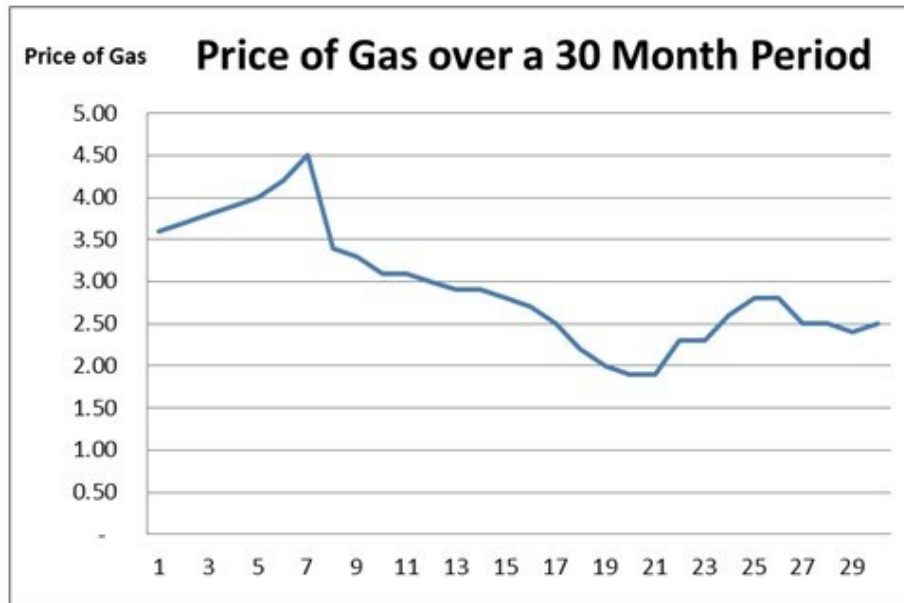
Bloom's: Understand; Apply

AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

97) Looking at the runs plot of gasoline prices over the past 30 months, describe what it tells us about the price of gas during these 30 months.

Answer:



The price of gas peaked in the seventh month. The lowest price is observed around 20 to 21 months from the start of the data collection. At the end of the 30 months, gas price is beginning to show stability.

Observing the rise and fall of a time series or runs plot.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-04 Construct and interpret a time series (runs) plot.

Bloom's: Understand; Apply

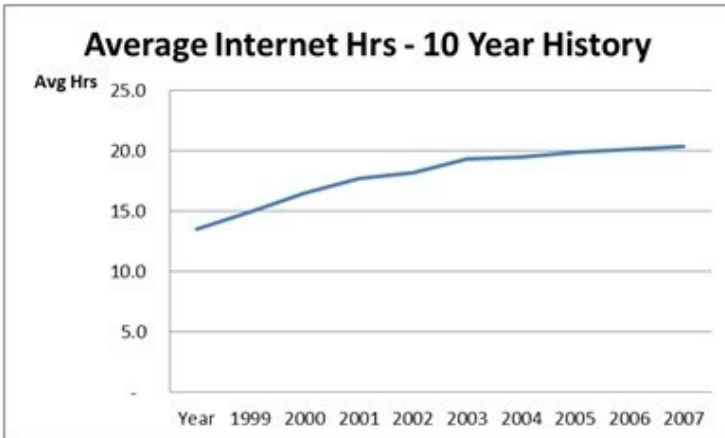
AACSB: Reflective Thinking

Accessibility: Keyboard Navigation

98) Using the following data table of the average hours per week spent on Internet activities by 15- to 18-year-olds for the years 1999 to 2008, construct the runs plot and interpret.

1999	13.5
2000	15.0
2001	16.5
2002	17.7
2003	18.2
2004	19.3
2005	19.5
2006	19.9
2007	20.1
2008	20.4

Answer:



Displaying the average hours spent on Internet activities graphically results in a time series or runs plot. An increase over time in the amount of time can be observed through either the graph or data.

Difficulty: 2 Medium

Topic: Data

Learning Objective: 01-04 Construct and interpret a time series (runs) plot.

Bloom's: Understand; Apply

AACSB: Analytical Thinking

Accessibility: Keyboard Navigation