Chapter 01

An Introduction to Business Statistics

**True / False Questions**

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| 1. | A population is a set of existing units.    True    False |

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| 2. | If we examine some of the population measurements, we are conducting a census of the population.    True    False |

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

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| 4. | An example of a quantitative variable is the manufacturer of a car.    True    False |

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| 5. | An example of a qualitative variable is the mileage of a car.    True    False |

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

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| 7. | Time series data are data collected at the same time period.    True    False |

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| 8. | Cross-sectional data are data collected at the same point in time.    True    False |

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

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

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| 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.    True    False |

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| 12. | A quantitative variable can also be referred to as a categorical variable.    True    False |

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

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| 14. | In an observational study, the variable of interest is called a response variable.    True    False |

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

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

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| 17. | It is possible to use a random sample from one population to make statistical inferences about another related population.    True    False |

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| 18. | Processes produce outputs over time.    True    False |

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| 19. | Selecting many different samples and running many different tests can eventually produce a result that makes a desired conclusion seem to be true when the conclusion is true.    True    False |

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

**Multiple Choice Questions**

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| 21. | A ratio variable has the following characteristic:      |  |  | | --- | --- | | A. | Meaningful order |  |  |  | | --- | --- | | B. | Inherently defined zero value |  |  |  | | --- | --- | | C. | Categorical in nature |  |  |  | | --- | --- | | D. | Predictable | |

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| 22. | 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 | |

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| 23. | 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 | |

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| 24. | Measurements from a population are called      |  |  | | --- | --- | | A. | Elements. |  |  |  | | --- | --- | | B. | Observations. |  |  |  | | --- | --- | | C. | Variables. |  |  |  | | --- | --- | | D. | Processes. | |

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| 25. | 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 | |

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| 26. | Temperature (in degrees Fahrenheit) is an example of a(n) \_\_\_\_\_\_\_\_\_\_ variable.      |  |  | | --- | --- | | A. | Nominative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | C. | Interval |  |  |  | | --- | --- | | D. | Ratio | |

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| 27. | Jersey numbers of soccer players is an example of a(n) \_\_\_\_\_\_\_\_\_\_\_ variable.      |  |  | | --- | --- | | A. | Nominative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | C. | Interval |  |  |  | | --- | --- | | D. | Ratio | |

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| 28. | 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 | |

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| 29. | An identification of police officers by rank would represent a(n) \_\_\_\_\_\_\_\_\_\_\_\_ level of measurement.      |  |  | | --- | --- | | A. | Nominative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | C. | Interval |  |  |  | | --- | --- | | D. | Ratio | |

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| 30. | \_\_\_\_\_\_\_\_\_\_ 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 | |

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| 31. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 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 | |

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| 32. | College entrance exam scores, such as SAT scores, are an example of a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_ variable.      |  |  | | --- | --- | | A. | Ordinal |  |  |  | | --- | --- | | B. | Ratio |  |  |  | | --- | --- | | C. | Nominative |  |  |  | | --- | --- | | D. | Interval | |

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| 33. | 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 | |

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| 34. | 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 | |

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| 35. | A person's telephone area code is an example of a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_ variable.      |  |  | | --- | --- | | A. | Nominative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | C. | Interval |  |  |  | | --- | --- | | D. | Ratio | |

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| 36. | Any characteristic of a population unit is a(n):      |  |  | | --- | --- | | A. | Measurement |  |  |  | | --- | --- | | B. | Sample |  |  |  | | --- | --- | | C. | Observation |  |  |  | | --- | --- | | D. | Variable | |

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| 37. | Examining all population measurements is called a \_\_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Census |  |  |  | | --- | --- | | B. | Frame |  |  |  | | --- | --- | | C. | Sample |  |  |  | | --- | --- | | D. | Variable | |

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| 38. | Any characteristic of an element is called a \_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Set |  |  |  | | --- | --- | | B. | Process |  |  |  | | --- | --- | | C. | Variable |  |  |  | | --- | --- | | D. | Census | |

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| 39. | 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 | |

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| 40. | A \_\_\_\_\_\_\_\_\_\_\_ is a display of individual measurements versus time.      |  |  | | --- | --- | | A. | Runs plot |  |  |  | | --- | --- | | B. | Statistical analysis |  |  |  | | --- | --- | | C. | Random sample |  |  |  | | --- | --- | | D. | Measurement | |

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| 41. | 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 | |

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| 42. | A \_\_\_\_\_\_\_\_\_\_\_\_ is a subset of the units in a population.      |  |  | | --- | --- | | A. | Census |  |  |  | | --- | --- | | B. | Process |  |  |  | | --- | --- | | C. | Sample |  |  |  | | --- | --- | | D. | Variable | |

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| 43. | A \_\_\_\_\_\_\_\_\_\_\_\_ variable can have values that are numbers on the real number line.      |  |  | | --- | --- | | A. | Qualitative |  |  |  | | --- | --- | | B. | Quantitative |  |  |  | | --- | --- | | C. | Categorical |  |  |  | | --- | --- | | D. | Nominative | |

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| 44. | 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 | |

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| 45. | 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 | |

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| 46. | A set of all elements we wish to study is called a \_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Sample |  |  |  | | --- | --- | | B. | Process |  |  |  | | --- | --- | | C. | Census |  |  |  | | --- | --- | | D. | Population | |

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| 47. | \_\_\_\_\_\_\_\_\_\_\_ 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 | |

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| 48. | The change in the daily price of a stock is what type of variable?      |  |  | | --- | --- | | A. | Qualitative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | C. | Random |  |  |  | | --- | --- | | D. | Quantitative | |

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| 49. | Data collected for a particular study are referred to as a data \_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Variable |  |  |  | | --- | --- | | B. | Measurement |  |  |  | | --- | --- | | C. | Set |  |  |  | | --- | --- | | D. | Element | |

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| 50. | A data set provides information about some group of individual \_\_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Variables |  |  |  | | --- | --- | | B. | Elements |  |  |  | | --- | --- | | C. | Statistics |  |  |  | | --- | --- | | D. | Measurements | |

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| 51. | When the data being studied are gathered from a private 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 | |

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| 52. | One method of determining whether a sample being studied can be used to make statistical inferences about the population is to:      |  |  | | --- | --- | | A. | Run a descriptive statistical analysis |  |  |  | | --- | --- | | B. | Calculate a proportion |  |  |  | | --- | --- | | C. | Create a cross-sectional data analysis |  |  |  | | --- | --- | | D. | Produce a runs plot | |

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| 53. | 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 these | |

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| 54. | 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 | |

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| 55. | 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 | |

**Essay Questions**

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| 56. | 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). |

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| 57. | 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? |

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| 58. | 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). |

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| 59. | 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. |

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| 60. | Using the following data table of the average hours per week spent on Internet activities by 15- to 18-year-olds for the years 1999-2008, construct the runs plot and interpret. |

Chapter 01 An Introduction to Business Statistics Answer Key

**True / False Questions**

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| 1. | A population is a set of existing units.    **TRUE** |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-06 Describe the difference between a population and a sample. Topic: Population* |

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| 2. | If we examine some of the population measurements, we are conducting a census of the population.    **FALSE**  A census is defined as examining all of the population measurements. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-06 Describe the difference between a population and a sample. Topic: Population* |

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

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-08 Explain the importance of random sampling. Topic: Random Sampling* |

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| 4. | An example of a quantitative variable is the manufacturer of a car.    **FALSE**  This is an example of a qualitative or categorical variable. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 1 Easy Learning Objective: 01-02 Describe the difference between a quantitative and a qualitative variable. Topic: Variable* |

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| 5. | An example of a qualitative variable is the mileage of a car.    **FALSE**  This is an example of a quantitative variable. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 1 Easy Learning Objective: 01-02 Describe the difference between a quantitative and a qualitative variable. Topic: Variable* |

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

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 2 Medium Learning Objective: 01-07 Distinguish between descriptive statistics and statistical inference. Topic: Sample* |

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| 7. | Time series data are data collected at the same time period.    **FALSE**  Time series data are collected over different time periods. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data. Topic: Time Series Data* |

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| 8. | Cross-sectional data are data collected at the same point in time.    **TRUE** |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data. Topic: Cross-Sectional Data* |

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| 9. | Daily temperature in a local community collected over a 30-day time period is an example of cross-sectional data.    **FALSE**  Cross-sectional data are collected at the same point in time. This is an example of time series data. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 1 Easy Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data. Topic: Cross-Sectional Data* |

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| 10. | The number of sick days taken by employees in 2008 for the top 10 technology companies is an example of time series data.    **FALSE**  This is an example of cross-sectional data. Time series data are collected at different time periods. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 1 Easy Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data. Topic: Time Series Data* |

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| 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.    **TRUE** |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data. Topic: Time Series Data* |

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| 12. | A quantitative variable can also be referred to as a categorical variable.    **FALSE**  Qualitative variables are also known as categorical variables. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 1 Easy Learning Objective: 01-02 Describe the difference between a quantitative and a qualitative variable. Topic: Quantitative Variable* |

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| 13. | In a data set of information on college business students, an example of an element is their cumulative GPA.    **FALSE**  The element is college business students. The cumulative GPA is an example of a variable, which is a characteristic of the element college business students. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-01 Explain what a variable is. Topic: Data* |

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| 14. | In an observational study, the variable of interest is called a response variable.    **TRUE** |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-05 Identify the different types of data sources: existing data sources; experimental studies; and observational studies. Topic: Data Sources* |

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| 15. | In an experimental study, the aim is to manipulate or set the value of the response variable.    **FALSE**  In experimental studies, the aim is to manipulate the factor, which is related to the response variable. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-05 Identify the different types of data sources: existing data sources; experimental studies; and observational studies. Topic: Data Sources* |

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

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-07 Distinguish between descriptive statistics and statistical inference. Topic: Statistical Inference* |

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| 17. | It is possible to use a random sample from one population to make statistical inferences about another related population.    **TRUE** |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-08 Explain the importance of random sampling. Topic: Random Sampling* |

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| 18. | Processes produce outputs over time.    **TRUE** |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-08 Explain the importance of random sampling. Topic: Process* |

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| 19. | Selecting many different samples and running many different tests can eventually produce a result that makes a desired conclusion seem to be true when the conclusion is true.    **FALSE**  Using different samples and tests to produce a desired conclusion does not make the conclusion true. |

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| *AACSB: Ethics Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-08 Explain the importance of random sampling. Topic: Ethical Guidelines* |

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

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| *AACSB: Ethics Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-08 Explain the importance of random sampling. Topic: Ethical Guidelines* |

**Multiple Choice Questions**

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| 21. | A ratio variable has the following characteristic:      |  |  | | --- | --- | | A. | Meaningful order |  |  |  | | --- | --- | | **B.** | Inherently defined zero value |  |  |  | | --- | --- | | C. | Categorical in nature |  |  |  | | --- | --- | | D. | Predictable |   By definition, ratio variables are quantitative and have an absolute zero value. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 1 Easy Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 22. | 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 |   A quantitative variable is measurable and noncategorical. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-02 Describe the difference between a quantitative and a qualitative variable. Topic: Variable* |

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| 23. | 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 |   A categorical variable is qualitative, not measured. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-02 Describe the difference between a quantitative and a qualitative variable. Topic: Variable* |

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| 24. | Measurements from a population are called      |  |  | | --- | --- | | A. | Elements. |  |  |  | | --- | --- | | **B.** | Observations. |  |  |  | | --- | --- | | C. | Variables. |  |  |  | | --- | --- | | D. | Processes. |   By definition, elements and variables are the same; processes are not measurements. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-06 Describe the difference between a population and a sample. Topic: Population* |

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| 25. | 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 |   Nominative and ordinal are types of qualitative variables. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 26. | Temperature (in degrees Fahrenheit) is an example of a(n) \_\_\_\_\_\_\_\_\_\_ variable.      |  |  | | --- | --- | | A. | Nominative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | **C.** | Interval |  |  |  | | --- | --- | | D. | Ratio |   Temperature is quantitative (excludes nominative and ordinal) and the ratio of two temperatures is not meaningful. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 27. | Jersey numbers of soccer players is an example of a(n) \_\_\_\_\_\_\_\_\_\_\_ variable.      |  |  | | --- | --- | | **A.** | Nominative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | C. | Interval |  |  |  | | --- | --- | | D. | Ratio |   Interval and ratio are quantitative variables; jersey numbers have no logical order. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 28. | 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 |   Nominative and ordinal are qualitative variables; weight creates logical ratios: 60 lbs is twice as heavy as 30 lbs. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 29. | An identification of police officers by rank would represent a(n) \_\_\_\_\_\_\_\_\_\_\_\_ level of measurement.      |  |  | | --- | --- | | A. | Nominative |  |  |  | | --- | --- | | **B.** | Ordinal |  |  |  | | --- | --- | | C. | Interval |  |  |  | | --- | --- | | D. | Ratio |   Interval and ratio are quantitative variables, nominative is only a naming category, and police rank has order. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 30. | \_\_\_\_\_\_\_\_\_\_ 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 |   A runs plot is a graphical display of time series data. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-04 Construct and interpret a time series (runs) plot. Topic: Time Series Data* |

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| 31. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 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 |   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. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-07 Distinguish between descriptive statistics and statistical inference. Topic: Population* |

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| 32. | College entrance exam scores, such as SAT scores, are an example of a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_ variable.      |  |  | | --- | --- | | A. | Ordinal |  |  |  | | --- | --- | | B. | Ratio |  |  |  | | --- | --- | | C. | Nominative |  |  |  | | --- | --- | | **D.** | Interval |   Nominative and ordinal are qualitative variables; exam scores have no meaningful ratio and no inherently defined zero value. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 3 Hard Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 33. | 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 |   Nominative and ordinal are qualitative variables; miles driven can have a meaningful ratio. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 34. | 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 |   Ratio and interval are quantitative variables; ordinal implies order or rank. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 1 Easy Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 35. | A person's telephone area code is an example of a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_ variable.      |  |  | | --- | --- | | **A.** | Nominative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | C. | Interval |  |  |  | | --- | --- | | D. | Ratio |   This is a qualitative variable without order; therefore, a nominative variable. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-09 Identify the ratio; interval; ordinal; and nominative scales of measurement. Topic: Variable* |

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| 36. | Any characteristic of a population unit is a(n):      |  |  | | --- | --- | | A. | Measurement |  |  |  | | --- | --- | | B. | Sample |  |  |  | | --- | --- | | C. | Observation |  |  |  | | --- | --- | | **D.** | Variable |   Measurement and observation are methods attached to a variable; a sample is a subset of the units in a population. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 2 Medium Learning Objective: 01-01 Explain what a variable is. Topic: Variable* |

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| 37. | Examining all population measurements is called a \_\_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | **A.** | Census |  |  |  | | --- | --- | | B. | Frame |  |  |  | | --- | --- | | C. | Sample |  |  |  | | --- | --- | | D. | Variable |   By definition, a census looks at the entire population. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 2 Medium Learning Objective: 01-06 Describe the difference between a population and a sample. Topic: Population* |

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| 38. | Any characteristic of an element is called a \_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Set |  |  |  | | --- | --- | | B. | Process |  |  |  | | --- | --- | | **C.** | Variable |  |  |  | | --- | --- | | D. | Census |   A process is a sequence of operations; a census looks at the entire population; set is related to population. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-01 Explain what a variable is. Topic: Population* |

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| 39. | 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 |   By definition, sampling is taking a portion of the population to measure; experimental and observational analysis are methods of obtaining data. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-01 Explain what a variable is. Topic: Variable* |

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| 40. | A \_\_\_\_\_\_\_\_\_\_\_ is a display of individual measurements versus time.      |  |  | | --- | --- | | **A.** | Runs plot |  |  |  | | --- | --- | | B. | Statistical analysis |  |  |  | | --- | --- | | C. | Random sample |  |  |  | | --- | --- | | D. | Measurement |   A runs plot is a graphical display of data over time. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-04 Construct and interpret a time series (runs) plot. Topic: Time Series Data* |

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| 41. | 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 |   By definition, inference is taking a sample of data and its measurements and relating those measurements to the population as a whole. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-07 Distinguish between descriptive statistics and statistical inference. Topic: Sample* |

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| 42. | A \_\_\_\_\_\_\_\_\_\_\_\_ is a subset of the units in a population.      |  |  | | --- | --- | | A. | Census |  |  |  | | --- | --- | | B. | Process |  |  |  | | --- | --- | | **C.** | Sample |  |  |  | | --- | --- | | D. | Variable |   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. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-06 Describe the difference between a population and a sample. Topic: Sample* |

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| 43. | A \_\_\_\_\_\_\_\_\_\_\_\_ variable can have values that are numbers on the real number line.      |  |  | | --- | --- | | A. | Qualitative |  |  |  | | --- | --- | | **B.** | Quantitative |  |  |  | | --- | --- | | C. | Categorical |  |  |  | | --- | --- | | D. | Nominative |   Qualitative, categorical, and nominative have similar definitions. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-02 Describe the difference between a quantitative and a qualitative variable. Topic: Variable* |

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| 44. | 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 |   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. |

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| *AACSB: Reflective Thinking Blooms: Remember Difficulty: 1 Easy Learning Objective: 01-04 Construct and interpret a time series (runs) plot. Topic: Process* |

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| 45. | 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 |   Quantitative, ratio, and interval all have similar definitions. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-02 Describe the difference between a quantitative and a qualitative variable. Topic: Variable* |

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| 46. | A set of all elements we wish to study is called a \_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Sample |  |  |  | | --- | --- | | B. | Process |  |  |  | | --- | --- | | C. | Census |  |  |  | | --- | --- | | **D.** | Population |   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. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-06 Describe the difference between a population and a sample. Topic: Population* |

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| 47. | \_\_\_\_\_\_\_\_\_\_\_ 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 |   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. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-07 Distinguish between descriptive statistics and statistical inference. Topic: Descriptive Statistics* |

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| 48. | The change in the daily price of a stock is what type of variable?      |  |  | | --- | --- | | A. | Qualitative |  |  |  | | --- | --- | | B. | Ordinal |  |  |  | | --- | --- | | C. | Random |  |  |  | | --- | --- | | **D.** | Quantitative |   Qualitative and ordinal have similar definitions; random variables are all characteristics of a population element. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-02 Describe the difference between a quantitative and a qualitative variable. Topic: Variable* |

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| 49. | Data collected for a particular study are referred to as a data \_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Variable |  |  |  | | --- | --- | | B. | Measurement |  |  |  | | --- | --- | | **C.** | Set |  |  |  | | --- | --- | | D. | Element |   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. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-01 Explain what a variable is. Topic: Data* |

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| 50. | A data set provides information about some group of individual \_\_\_\_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | Variables |  |  |  | | --- | --- | | **B.** | Elements |  |  |  | | --- | --- | | C. | Statistics |  |  |  | | --- | --- | | D. | Measurements |   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. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-01 Explain what a variable is. Topic: Data* |

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| 51. | When the data being studied are gathered from a private 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 |   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 a method of analyzing data, not the collection of data. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-05 Identify the different types of data sources: existing data sources; experimental studies; and observational studies. Topic: Data Sources* |

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| 52. | One method of determining whether a sample being studied can be used to make statistical inferences about the population is to:      |  |  | | --- | --- | | A. | Run a descriptive statistical analysis |  |  |  | | --- | --- | | B. | Calculate a proportion |  |  |  | | --- | --- | | C. | Create a cross-sectional data analysis |  |  |  | | --- | --- | | **D.** | Produce a runs plot |   Runs plot are a way of looking at processes over time, which can then be utilized 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. |

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| *AACSB: Reflective Thinking Blooms: Apply Difficulty: 3 Hard Learning Objective: 01-08 Explain the importance of random sampling. Topic: Random Sampling* |

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| 53. | 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 these |   It is unethical to use methods or procedures designed to mislead the audience that is viewing the findings. |

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| *AACSB: Ethics Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-08 Explain the importance of random sampling. Topic: Ethical Guidelines* |

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| 54. | 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 |   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. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data. Topic: Cross-Sectional Data* |

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| 55. | 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 |   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. |

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| *AACSB: Reflective Thinking Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-03 Describe the difference between cross-sectional data and time series data. Topic: Time Series Data* |

**Essay Questions**

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| 56. | 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).     The response variable in this study is the number of miles driven over the past 30 days.  Feedback: Response variables are defined as the variable of interest in a study. |

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| *AACSB: Reflective Thinking Blooms: Apply Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-05 Identify the different types of data sources: existing data sources; experimental studies; and observational studies. Topic: Observational Study* |

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| 57. | 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?     Observational study  Feedback: 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. |

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| *AACSB: Reflective Thinking Blooms: Apply Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-05 Identify the different types of data sources: existing data sources; experimental studies; and observational studies. Topic: Observational Study* |

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| 58. | 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).     Factors in this study are location of residence, type of car, number of miles from work, number of children under 18, and monthly income.  Feedback: Factors are related to the variable of interest. |

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| *AACSB: Reflective Thinking Blooms: Apply Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-05 Identify the different types of data sources: existing data sources; experimental studies; and observational studies. Topic: Observational Study* |

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| 59. | 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.         The price of gas peaked in the 7th month. The lowest price is observed around 20-21 months from the start of the data collection. At the end of the 30 months, gas price is beginning to show stability.  Feedback: Observing the rise and fall of a time series or runs plot. |

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| *AACSB: Reflective Thinking Blooms: Apply Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-04 Construct and interpret a time series (runs) plot. Topic: Time Series Data* |

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| 60. | Using the following data table of the average hours per week spent on Internet activities by 15- to 18-year-olds for the years 1999-2008, construct the runs plot and interpret.            Hours spent on the Internet have increased over the 10 years but show a slight leveling off in the last 3 years.  Feedback: 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. |

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| *AACSB: Reflective Thinking Blooms: Apply Blooms: Understand Difficulty: 2 Medium Learning Objective: 01-04 Construct and interpret a time series (runs) plot. Topic: Time Series Data* |