

## Chapter 02

### Data Collection

#### True / False Questions

1. Categorical data have values that are described by words rather than numbers.

True   False

2. Numerical data can be either discrete or continuous.

True   False

3. Categorical data are also referred to as nominal or qualitative data.

True   False

4. The number of checks processed at a bank in a day is an example of categorical data.

True   False

5. The number of planes per day that land at an airport is an example of discrete data.

True False

6. The weight of a bag of dog food is an example of discrete data.

True False

7. In last year's annual report, Thompson Distributors indicated that it had 12 regional warehouses. This is an example of ordinal level data.

True False

8. Nominal data refer to data that can be ordered in a natural way.

True False

9. This year, Oxnard University produced two football All-Americans. This is an example of continuous data.

True False

10. The type of statistical test that we can perform is independent of the level of measurement of the variable of interest.

True False

11. Your weight recorded at your annual physical would *not* be ratio data because you cannot have zero weight.

True   False

12. The level of measurement for categorical data is nominal.

True   False

13. Temperature measured in degrees Fahrenheit is an example of interval data.

True   False

14. The closing price of a stock is an example of ratio data.

True   False

15. The *Statistical Abstract of the United States* is a huge annual compendium of data for the United States and it is available online free of charge.

True   False

16. Ordinal data can be treated as if it were nominal data but not vice versa.

True   False

17. Responses on a seven-point Likert scale are usually treated as ratio data.

True   False

18. Likert scales are especially important in opinion polls and marketing surveys.

True   False

19. Ordinal data are data that can be ranked based on some natural characteristic of the items.

True   False

20. Ratio data are distinguished from interval data by the presence of a zero reference point.

True   False

21. It is better to attempt a census of a large population instead of relying on a sample.

True   False

22. Judgment sampling and convenience sampling are non-random sampling techniques.

True   False

23. A problem with judgment sampling is that the sample may not reflect the population.

True   False

24. When the population is large, a sample estimate is usually preferable to a census.

True   False

25. Sampling error is avoidable by choosing the sample scientifically.

True   False

26. A sampling frame is used to identify the target population in a statistical study.

True   False

27. By taking a systematic sample, in which we select every 50<sup>th</sup> shopper arriving at a specific store, we are approximating a random sample of shoppers.

True   False

28. A worker collecting data from every other shopper who leaves a store is taking a simple random sample of customer opinion.

True   False

29. Creating a list of people by taking the third name listed on every 10<sup>th</sup> page of the phone book is an example of convenience sampling.

True   False

30. Internet surveys posted on popular websites have no bias since anyone can reply.

True   False

31. Analysis of month-by-month changes in stock market prices during the most recent recession would require the use of time series data.

True   False

32. A cluster sample is a type of stratified sample that is based on geographical location.

True   False

33. An advantage of a systematic sample is that no list of enumerated data items is required.

True   False

34. Telephone surveys often have a low response rate and fail to reach the desired population.

True False

35. Mail surveys are attractive because of their high response rates.

True False

36. A problem with convenience sampling is that the target population is not well defined.

True False

37. If you randomly sample 50 students about their favorite places to eat, the data collected would be referred to as cross-sectional data.

True False

38. The number of FedEx shipping centers in each of 50 cities would be ordinal level data.

True False

39. Internet surveys posted on popular websites such as MSN.com suffer from nonresponse bias.

True   False

### Multiple Choice Questions

40. An investment firm rates bonds for AardCo Inc. as "B+" while bonds of Deva Corp. are rated "AA." Which level of measurement would be appropriate for such data?

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

41. Which variable is *least* likely to be regarded as ratio data?

- A. Length of time required for a randomly chosen vehicle to cross a toll bridge (minutes)
- B. Weight of a randomly chosen student (pounds)
- C. Number of fatalities in a randomly chosen traffic disaster (persons)
- D. Student's evaluation of a professor's teaching (Likert scale)



42. Which of the following is numerical data?

- A. Your gender
- B. The brand of cell phone you own
- C. Whether you have an American Express card
- D. The fuel economy (MPG) of your car

43. Measurements from a sample are called:

- A. statistics.
- B. inferences.
- C. parameters.
- D. variables.

44. Quantitative variables use which two levels of measurement?

- A. Ordinal and ratio
- B. Interval and ordinal
- C. Nominal and ordinal
- D. Interval and ratio

45. Temperature in degrees Fahrenheit is an example of a(n) \_\_\_\_\_ variable.

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

46. Using a sample to make generalizations about an aspect of a population is called:

- A. data mining.
- B. descriptive statistics.
- C. random sampling.
- D. statistical inference.

47. Your telephone area code is an example of a(n) \_\_\_\_\_ variable.

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

48. Which is *least* likely to be regarded as a ratio variable?

- A. A critic's rating of a restaurant on a 1 to 4 scale
- B. Automobile exhaust emission of nitrogen dioxide (milligrams per mile)
- C. Number of customer complaints per day at a cable TV company office
- D. Cost of an e-Bay purchase

49. Automobile exhaust emission of CO<sub>2</sub> (milligrams per mile) is \_\_\_\_\_ data.

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

50. Your rating of the food served at a local restaurant using a three-point scale of 0 = gross, 1 = decent, 2 = yummy is \_\_\_\_\_ data.

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

51. The number of passengers "bumped" on a particular airline flight is \_\_\_\_\_ data.

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

52. Which should *not* be regarded as a continuous random variable?

- A. Tonnage carried by a randomly chosen oil tanker at sea
- B. Wind velocity at 7 o'clock this morning
- C. Number of personal fouls by the Miami Heat in a game
- D. Length of time to play a Wimbledon tennis match

53. Which of the following is *not* true?

- A. Categorical data have values that are described by words rather than numbers.
- B. Categorical data are also referred to as nominal or qualitative data.
- C. The number of checks processed at a bank in a day is categorical data.
- D. Numerical data can be either discrete or continuous.

54. Which of the following is true?

- A. The type of charge card used by a customer (Visa, MasterCard, AmEx) is ordinal data.
- B. The duration (minutes) of a flight from Boston to Minneapolis is ratio data.
- C. The number of Nobel Prize-winning faculty at Oxnard University is continuous data.
- D. The number of regional warehouses owned by Jankord Industries is ordinal data.

55. Which statement is *correct*?

- A. Judgment sampling is preferred to systematic sampling.
- B. Sampling without replacement introduces bias in our estimates of parameters.
- C. Cluster sampling is useful when strata characteristics are unknown.
- D. Focus groups usually work best without a moderator.

56. A Likert scale:

- A. yields interval data if scale distances are equal.
- B. must have an odd number of scale points.
- C. must have a verbal label on each scale point.
- D. is rarely used in marketing surveys.

57. Which is most nearly correct regarding sampling error?

- A. It can be eliminated by increasing the sample size.
- B. It cannot be eliminated by any statistical sampling method.
- C. It can be eliminated by using Excel's =RANDBETWEEN() function.
- D. It can be eliminated by utilizing systematic random sampling.

58. Which statement is *false*?

- A. Random dialing phone surveys have low response and are poorly targeted.
- B. Selection bias means that many respondents dislike the interviewer.
- C. Simple random sampling requires a list of the population.
- D. Web surveys are economical but suffer from nonresponse bias.

59. Judgment sampling is sometimes preferred over random sampling, for example, when:

- A. the desired sample size is much larger than the population.
- B. the sampling budget is large and the population is conveniently located.
- C. time is short and the sampling budget is limited.
- D. the population is readily accessible and sampling is nondestructive.

60. An advantage of convenience samples is that:

- A. the required sample size is easier to calculate.
- B. sampling error can be reduced.
- C. computation of statistics is easier.
- D. they are often quicker and cheaper.

61. Before deciding whether to assess heavy fines against noisy airlines, which sampling method would the Federal Aviation Administration *probably* use to measure the peak noise from departing jets as measured by a ground-level observer at a point one mile from the end of the departure runway?

- A. Radio survey of pilots.
- B. Simple random sample.
- C. Judgment sample.
- D. Stratified sample using.

62. Professor Hardtack chose a sample of 7 students from his statistics class of 35 students by picking every student who was wearing red that day. Which kind of sample is this?

- A. Simple random sample
- B. Judgment sample
- C. Systematic sample
- D. Convenience sample

63. Thirty work orders are selected from a filing cabinet containing 500 work order folders by choosing every 15<sup>th</sup> folder. Which sampling method is this?

- A. Simple random sample
- B. Systematic sample
- C. Stratified sample
- D. Cluster sample

64. Which of the following is *not* a likely reason for sampling?

- A. The destructive nature of certain tests
- B. The physical impossibility of checking all the items in the population
- C. Prohibitive cost of studying the entire population
- D. The expense of obtaining random numbers



65. Comparing a census of a large population to a sample drawn from it, we expect that the:

- A. sample is usually a more practical method of obtaining the desired information.
- B. accuracy of the observations in the census is surely higher than in the sample.
- C. sample must be a large fraction of the population to be accurate.

66. A stratified sample is sometimes recommended when:

- A. the sample size is very large.
- B. the population is small compared to the sample.
- C. distinguishable strata can be identified in the populations.
- D. the population is spread out geographically.

67. A *random sample* is one in which the:

- A. probability that an item is selected for the sample is the same for all population items.
- B. population items are selected haphazardly by experienced workers.
- C. items to be selected from the population are specified based on expert judgment.
- D. probability of selecting a population item depends on the item's data value.

68. An advantage of convenience samples over random samples is that:

- A. they are easy to analyze.
- B. it is easier to determine the sample size needed.
- C. it is easier to calculate the sampling errors involved.
- D. data collection cost is reduced.

69. To measure satisfaction with its cell phone service, AT&T takes a stratified sample of its customers by age, gender, and location. Which is an advantage of this type of sampling, as opposed to other sampling methods?

- A. It is less intrusive on customers' privacy.
- B. It does not require random numbers.
- C. It gives faster results.
- D. It can give more accurate results.

70. An accounting professor wishing to know how many MBA students would take a summer elective in international accounting did a survey of the class she was teaching. Which kind of sample is this?

- A. Simple random sample
- B. Cluster sample
- C. Systematic sample
- D. Convenience sample

71. A binary variable (also called a dichotomous variable or dummy variable) has:

- A. only two possible values.
- B. continuous scale values.
- C. rounded data values.
- D. ordinal or interval values.

72. A population has groups that have a small amount of variation within them, but large variation among or between the groups themselves. The proper sampling technique is:

- A. simple random.
- B. stratified.
- C. cluster.
- D. judgment.

73. A manager chose two people from his team of eight to give an oral presentation because she felt they were representative of the whole team's views. What sampling technique did she use in choosing these two people?

- A. Convenience
- B. Simple random
- C. Judgment
- D. Cluster

74. Sampling bias can best be reduced by:

- A. using appropriate data coding.
- B. having a computer tabulate the results.
- C. utilizing random sampling.
- D. taking a judgment sample.

75. A sampling technique used when groups are defined by their geographical location is:

- A. cluster sampling.
- B. convenience sampling.
- C. judgment sampling.
- D. random sampling.

76. If we choose 500 random numbers using Excel's function =RANDBETWEEN(1,99), we would *most likely* find that:

- A. numbers near the mean (50) would tend to occur more frequently.
- B. numbers near 1 and 99 would tend to occur less frequently.
- C. some numbers would occur more than once.
- D. the numbers would have a clear pattern.

77. A problem with nonrandom sampling is that:

- A. larger samples need to be taken to reduce the sampling error inherent in this approach.
- B. not every item in the population has the same chance of being selected, as it should.
- C. it is usually more expensive than random sampling.
- D. it generally provides lower response rates than random sampling.

78. From its 32 regions, the FAA selects 6 regions, and then randomly audits 25 departing commercial flights in each region for compliance with legal fuel and weight requirements. This is an example of:

- A. simple random sampling.
- B. stratified random sampling.
- C. cluster sampling.
- D. judgment sampling.

79. Which of the following is a *correct* statement?

- A. Choosing the third person listed on every fifth page of the phone book is stratified sampling.
- B. An advantage of a systematic sample is that no list of enumerated data items is required.
- C. Convenience sampling is used to study shoppers in convenience stores.
- D. Judgment sampling is an example of true random sampling.

80. Which of the following is *false*?

- A. Sampling error is the difference between the true parameter and a random number in Excel.
- B. Sampling error is a result of unavoidable random variation in a sample.
- C. A sampling frame is used to help identify the target population in a statistical study.
- D. The target population must first be defined by a full list or data file of individuals.

81. 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 sample.

82. Which method is likely to be used by a journalism student who is casually surveying opinions of students about the university's cafeteria food for an article that she is writing?

- A. Simple random sample
- B. Systematic random sample
- C. Cluster sample
- D. Convenience sample

83. Which of the following is *false*?

- A. Mail surveys are cheap but have low response rates.
- B. Coverage error is when respondents give untruthful answers.
- C. Focus groups are nonrandom but can probe issues more deeply.
- D. Surveys posted on popular websites suffer from selection bias.

84. Which is a time series variable?

- A. VISA balances of 30 students on December 31 of this year
- B. Net earnings reported by Xena Corp. for the last 10 quarters
- C. Dollar exchange rates yesterday against 10 other world currencies
- D. Titles of the top 10 movies in total revenue last week

85. An *observation* in a data set would refer to:

- A. only a variable whose value is recorded by visual inspection.
- B. a data item whose value is numerical (as opposed to categorical).
- C. a single row that contains one or more observed variables.
- D. the values of all the variables in the entire data set.

86. A *multivariate* data set contains:

- A. more than two observations.
- B. more than two categorical variables.
- C. more than two variables.
- D. more than two levels of measurement.



87. The Centers for Disease Control and Prevention (CDC) wants to estimate the average extra hospital stay that occurs when heart surgery patients experience postoperative atrial fibrillation. They divide the United States into nine regions. In each region, hospitals are selected at random within each hospital size group (small, medium, large). In each hospital, heart surgery patients are sampled according to known percentages by age group (under 50, 50 to 64, 65 and over) and gender (male, female). This procedure combines which sampling methods?

- A. Systematic, simple random, and convenience
- B. Convenience, systematic, and judgment
- C. Cluster, stratified, and simple random
- D. Judgment, systematic, and simple random

88. Which statement is correct?

- A. Selecting every fifth shopper arriving at a store will approximate a random sample of shoppers.
- B. Selecting only shoppers who drive SUVs is a stratified sampling method.
- C. A census is preferable to a sample for most business problems.
- D. Stratified samples are usually cheaper than other methods.

89. Which is a categorical variable?

- A. The brand of jeans you usually wear
- B. The price you paid for your last pair of jeans
- C. The distance to the store where you purchased your last pair of jeans
- D. The number of pairs of jeans that you own

90. Which is a discrete variable?

- A. The time it takes to put on a pair of jeans
- B. The price you paid for your last pair of jeans
- C. The distance to the store where you purchased your last pair of jeans
- D. The number of pairs of jeans that you own

91. A section of the population we have targeted for analysis is:

- A. a statistic.
- B. a frame.
- C. a sample.
- D. a coven.

### Short Answer Questions

92. Which survey method would you recommend to survey opinions of airline passengers about the cleanliness of the restrooms in the Detroit airport? Why not the others?

93. What kind of sampling method would you suggest in order to tabulate the number of formulas on a typical page of the Doane-Seward textbook? Defend your choice.

94. How would you design a study to see whether drivers using hands-free cell phones are distracted enough to slow their reactions to emergency situations? How would you collect data?

95. Explain the concept of a focus group. In what ways does a focus group resemble a survey? Why is a moderator desirable? What else is required to make a successful focus group?

## Chapter 02 Data Collection Answer Key

### True / False Questions

1. Categorical data have values that are described by words rather than numbers.

TRUE

Categories are nominal data but could also be ranked (e.g., sophomore, junior, senior).

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

2. Numerical data can be either discrete or continuous.

TRUE

Numerical data can be counts (e.g., cars owned) or continuous scales (e.g., height).

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

3. Categorical data are also referred to as nominal or qualitative data.

**TRUE**

Categories are nominal data (nonnumerical), sometimes called qualitative data.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

4. The number of checks processed at a bank in a day is an example of categorical data.

**FALSE**

Integers are actually numerical data.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

5. The number of planes per day that land at an airport is an example of discrete data.

**TRUE**

Integers are discrete numerical data.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

6. The weight of a bag of dog food is an example of discrete data.

**FALSE**

Weight is measured on a continuous scale.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

7. In last year's annual report, Thompson Distributors indicated that it had 12 regional warehouses. This is an example of ordinal level data.

**FALSE**

"Number of" is a count, which is ratio data because a zero exists (better than ordinal).

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 1 Easy*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

8. Nominal data refer to data that can be ordered in a natural way.

**FALSE**

Nominal (categorical) data would be called ordinal only if categories can be ranked.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*



9. This year, Oxnard University produced two football All-Americans. This is an example of continuous data.

**FALSE**

The "number of" anything is discrete.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

10. The type of statistical test that we can perform is independent of the level of measurement of the variable of interest.

**FALSE**

Some statistical operations are restricted unless you have ratio or interval data.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

11. Your weight recorded at your annual physical would *not* be ratio data because you cannot have zero weight.

**FALSE**

Zero is only a reference point, not necessarily an observable data value.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

12. The level of measurement for categorical data is nominal.

**TRUE**

Categorical and nominal are equivalent terms.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

13. Temperature measured in degrees Fahrenheit is an example of interval data.

TRUE

For temperature, scale distances are meaningful (20 to 25 is the same as 50 to 55 degrees) and 0 degrees Fahrenheit does not mean the absence of heat so it is not a ratio measurement.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

14. The closing price of a stock is an example of ratio data.

TRUE

True zero exists as a reference, whether or not it is observed.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

15. The *Statistical Abstract of the United States* is a huge annual compendium of data for the United States and it is available online free of charge.

TRUE

A useful reference for business (e.g., for marketing, economics, or finance).

*AACSB: Technology*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-08 Find everyday print or electronic data sources.*

*Topic: Data Sources*

16. Ordinal data can be treated as if it were nominal data but not vice versa.

TRUE

You can always go back to a lower level of measurement (but not *vice versa*).

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

17. Responses on a seven-point Likert scale are usually treated as ratio data.

**FALSE**

No true zero point exists.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 02-05 Recognize a Likert scale and know how to use it.*

*Topic: Level of Measurement*

18. Likert scales are especially important in opinion polls and marketing surveys.

**TRUE**

Likert scales are used in all business areas.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-05 Recognize a Likert scale and know how to use it.*

*Topic: Level of Measurement*

19. Ordinal data are data that can be ranked based on some natural characteristic of the items.

TRUE

For example, the eras Jurassic, Paleozoic, and Mesozoic can be ranked in time.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

20. Ratio data are distinguished from interval data by the presence of a zero reference point.

TRUE

The true zero is a reference that need not be observable.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

21. It is better to attempt a census of a large population instead of relying on a sample.

**FALSE**

A census may founder on cost and time, while samples can be quick and accurate.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 02-06 Use the correct terminology for samples and populations.*

*Topic: Sampling Concepts*

22. Judgment sampling and convenience sampling are non-random sampling techniques.

**TRUE**

To be random, every item must have the same chance of being chosen.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

23. A problem with judgment sampling is that the sample may not reflect the population.

TRUE

While better than mere convenience, judgment may still have flaws.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

24. When the population is large, a sample estimate is usually preferable to a census.

TRUE

A census may founder on cost and time, while samples can be quick and accurate.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 02-06 Use the correct terminology for samples and populations.*

*Topic: Sampling Concepts*



25. Sampling error is avoidable by choosing the sample scientifically.

FALSE

Sampling error is unavoidable, though it can be reduced by careful sampling.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

26. A sampling frame is used to identify the target population in a statistical study.

TRUE

Only some portion of the population may be targeted (e.g., independent voters).

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-06 Use the correct terminology for samples and populations.*

*Topic: Sampling Concepts*

27. By taking a systematic sample, in which we select every 50<sup>th</sup> shopper arriving at a specific store, we are approximating a random sample of shoppers.

**TRUE**

There is no bias if this method is implemented correctly.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

28. A worker collecting data from every other shopper who leaves a store is taking a simple random sample of customer opinion.

**FALSE**

Not unless the target population is customers who shopped today (cf., all customers).

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

29. Creating a list of people by taking the third name listed on every 10<sup>th</sup> page of the phone book is an example of convenience sampling.

**FALSE**

This resembles two-stage cluster sampling combined with systematic sampling.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

30. Internet surveys posted on popular websites have no bias since anyone can reply.

**FALSE**

Self-selection bias exists (respondents may be atypical).

*AACSB: Technology*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 02-09 Describe basic elements of survey design; survey types; and sources of error.*

*Topic: Surveys*

31. Analysis of month-by-month changes in stock market prices during the most recent recession would require the use of time series data.

TRUE

Data collected over time is a time series.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-03 Explain the difference between time series and cross-sectional data.*

*Topic: Definitions*

32. A cluster sample is a type of stratified sample that is based on geographical location.

TRUE

For example, sampling voters randomly within random zip codes.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

33. An advantage of a systematic sample is that no list of enumerated data items is required.

TRUE

Systematic sampling works with a list (like random sampling) but also without one.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

34. Telephone surveys often have a low response rate and fail to reach the desired population.

TRUE

Phone surveys are cheaper, but it is hard to avoid these problems.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-09 Describe basic elements of survey design; survey types; and sources of error.*

*Topic: Surveys*

35. Mail surveys are attractive because of their high response rates.

FALSE

Mail surveys have low response rates and invite self-selection bias.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-09 Describe basic elements of survey design; survey types; and sources of error.*

*Topic: Surveys*

36. A problem with convenience sampling is that the target population is not well defined.

TRUE

Convenience sampling is quick but not random and target population is unclear.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

37. If you randomly sample 50 students about their favorite places to eat, the data collected would be referred to as cross-sectional data.

TRUE

Data for individuals would be a cross section (not a time series).

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-03 Explain the difference between time series and cross-sectional data.*

*Topic: Definitions*

38. The number of FedEx shipping centers in each of 50 cities would be ordinal level data.

FALSE

The "number of" anything is ratio data because a true zero reference point exists.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

39. Internet surveys posted on popular websites such as MSN.com suffer from nonresponse bias.

TRUE

Nonresponse or self-selection bias is rampant in such surveys.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-09 Describe basic elements of survey design; survey types; and sources of error.*

*Topic: Surveys*

## Multiple Choice Questions



40. An investment firm rates bonds for AardCo Inc. as "B+" while bonds of Deva Corp. are rated "AA." Which level of measurement would be appropriate for such data?

A. Nominal

**B.** Ordinal

C. Interval

D. Ratio

Ranks are clear, but interval would require assumed equal scale distances (doubtful).

*AACSB: Analytic*

*Blooms: Evaluate*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

41. Which variable is *least* likely to be regarded as ratio data?

- A. Length of time required for a randomly chosen vehicle to cross a toll bridge (minutes)
- B. Weight of a randomly chosen student (pounds)
- C. Number of fatalities in a randomly chosen traffic disaster (persons)
- D. Student's evaluation of a professor's teaching (Likert scale)

Likert scales have no true zero.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

42. Which of the following is numerical data?

- A. Your gender
- B. The brand of cell phone you own
- C. Whether you have an American Express card
- D. The fuel economy (MPG) of your car

Fuel economy is numerical.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 1 Easy*

43. Measurements from a sample are called:

- A. statistics.
- B. inferences.
- C. parameters.
- D. variables.

A measurement calculated from a sample is a statistic.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-06 Use the correct terminology for samples and populations.*

*Topic: Sampling Methods*

44. Quantitative variables use which two levels of measurement?

- A. Ordinal and ratio
- B. Interval and ordinal
- C. Nominal and ordinal
- D. Interval and ratio

Numerical (quantitative) data can be interval or ratio.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

45. Temperature in degrees Fahrenheit is an example of a(n) \_\_\_\_\_ variable.

A. nominal

B. ordinal

C. interval

D. ratio

No true zero exists except on the Kelvin scale.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 1 Easy*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

46. Using a sample to make generalizations about an aspect of a population is called:

- A. data mining.
- B. descriptive statistics.
- C. random sampling.
- D. statistical inference.

Generalizing from a sample to a population is an inference.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-06 Use the correct terminology for samples and populations.*

*Topic: Sampling Concepts*

47. Your telephone area code is an example of a(n) \_\_\_\_\_ variable.

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

Area codes are not even ranked, so just nominal.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

48. Which is *least* likely to be regarded as a ratio variable?

- A. A critic's rating of a restaurant on a 1 to 4 scale
- B. Automobile exhaust emission of nitrogen dioxide (milligrams per mile)
- C. Number of customer complaints per day at a cable TV company office
- D. Cost of an e-Bay purchase

Ratings on a Likert scale have no meaningful zero.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

49. Automobile exhaust emission of CO<sub>2</sub> (milligrams per mile) is \_\_\_\_\_ data.

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

True zero exists.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

50. Your rating of the food served at a local restaurant using a three-point scale of 0 = gross, 1 = decent, 2 = yummy is \_\_\_\_\_ data.

A. nominal

B. ordinal

C. interval

D. ratio

Only rankings implied (not equal scale distances).

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

51. The number of passengers "bumped" on a particular airline flight is \_\_\_\_\_ data.

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

True zero exists.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 1 Easy*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

52. Which should *not* be regarded as a continuous random variable?

- A. Tonnage carried by a randomly chosen oil tanker at sea
- B. Wind velocity at 7 o'clock this morning
- C. Number of personal fouls by the Miami Heat in a game
- D. Length of time to play a Wimbledon tennis match

Counting things yields integer (discrete) data.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*



53. Which of the following is *not* true?

- A. Categorical data have values that are described by words rather than numbers.
- B. Categorical data are also referred to as nominal or qualitative data.
- C. The number of checks processed at a bank in a day is categorical data.
- D. Numerical data can be either discrete or continuous.

The "number of" anything is a discrete numerical variable.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

54. Which of the following is true?

- A. The type of charge card used by a customer (Visa, MasterCard, AmEx) is ordinal data.
- B. The duration (minutes) of a flight from Boston to Minneapolis is ratio data.
- C. The number of Nobel Prize-winning faculty at Oxnard University is continuous data.
- D. The number of regional warehouses owned by Jankord Industries is ordinal data.

True zero exists (not observable, but as a reference point) so ratios have meaning.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-04 Recognize levels of measurement in data and ways of coding data.*

*Topic: Level of Measurement*

55. Which statement is *correct*?

- A. Judgment sampling is preferred to systematic sampling.
- B. Sampling without replacement introduces bias in our estimates of parameters.
- C. Cluster sampling is useful when strata characteristics are unknown.
- D. Focus groups usually work best without a moderator.

Review the characteristics of each sampling method.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

56. A Likert scale:

- A. yields interval data if scale distances are equal.
- B. must have an odd number of scale points.
- C. must have a verbal label on each scale point.
- D. is rarely used in marketing surveys.

Marketers use Likert scales and try to make scales with meaningful intervals.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

57. Which is most nearly correct regarding sampling error?

- A. It can be eliminated by increasing the sample size.
- B. It cannot be eliminated by any statistical sampling method.
- C. It can be eliminated by using Excel's =RANDBETWEEN() function.
- D. It can be eliminated by utilizing systematic random sampling.

Sampling involves error, though it can be minimized by proper methodology.

58. Which statement is *false*?

- A. Random dialing phone surveys have low response and are poorly targeted.
- B. Selection bias means that many respondents dislike the interviewer.
- C. Simple random sampling requires a list of the population.
- D. Web surveys are economical but suffer from nonresponse bias.

Selection bias occurs when respondents are atypical.

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 02-09 Describe basic elements of survey design; survey types; and sources of error.*

*Topic: Surveys*

59. Judgment sampling is sometimes preferred over random sampling, for example, when:

- A. the desired sample size is much larger than the population.
- B. the sampling budget is large and the population is conveniently located.
- C. time is short and the sampling budget is limited.
- D. the population is readily accessible and sampling is nondestructive.

Judgment sampling can save time and may be better than mere convenience.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

60. An advantage of convenience samples is that:

- A. the required sample size is easier to calculate.
- B. sampling error can be reduced.
- C. computation of statistics is easier.
- D. they are often quicker and cheaper.

Convenience samples are quick, with a possible trade-off of accuracy.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

61. Before deciding whether to assess heavy fines against noisy airlines, which sampling method would the Federal Aviation Administration *probably* use to measure the peak noise from departing jets as measured by a ground-level observer at a point one mile from the end of the departure runway?
- A. Radio survey of pilots.
  - B. Simple random sample.
  - C. Judgment sample.
  - D. Stratified sample using.

Pilots can't assess noise (the measurements must be taken from the ground). No list is available for the unpredictable mix of departing flights, so we can't use a simple random sample. A judgment sample would not provide an objective basis for assessing heavy fines. A reasonable option would be for ground observers to record the aircraft size, type, and carrier (airline) for each departing flight for a week and use this information to construct a stratified sample.

*AACSB: Analytic*

*Blooms: Evaluate*

*Difficulty: 3 Hard*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

62. Professor Hardtack chose a sample of 7 students from his statistics class of 35 students by picking every student who was wearing red that day. Which kind of sample is this?

- A. Simple random sample
- B. Judgment sample
- C. Systematic sample
- D. Convenience sample

Quick but may not be representative of all students.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*



63. Thirty work orders are selected from a filing cabinet containing 500 work order folders by choosing every 15<sup>th</sup> folder. Which sampling method is this?

- A. Simple random sample
- B. Systematic sample
- C. Stratified sample
- D. Cluster sample

Classic systematic sample from an accessible but unlisted population.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

64. Which of the following is *not* a likely reason for sampling?

- A. The destructive nature of certain tests
- B. The physical impossibility of checking all the items in the population
- C. Prohibitive cost of studying the entire population
- D. The expense of obtaining random numbers

Random numbers are cheap (e.g., Excel).

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

65. Comparing a census of a large population to a sample drawn from it, we expect that the:

- A. sample is usually a more practical method of obtaining the desired information.
- B. accuracy of the observations in the census is surely higher than in the sample.
- C. sample must be a large fraction of the population to be accurate.

Census is often impractical, while samples can be extremely accurate.

66. A stratified sample is sometimes recommended when:

- A. the sample size is very large.
- B. the population is small compared to the sample.
- C. distinguishable strata can be identified in the populations.
- D. the population is spread out geographically.

Identifiable strata such as gender, ethnicity, or region can be used.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

67. A *random sample* is one in which the:

- A. probability that an item is selected for the sample is the same for all population items.
- B. population items are selected haphazardly by experienced workers.
- C. items to be selected from the population are specified based on expert judgment.
- D. probability of selecting a population item depends on the item's data value.

Each item must have the same chance of being picked if the sample is random.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

68. An advantage of convenience samples over random samples is that:

- A. they are easy to analyze.
- B. it is easier to determine the sample size needed.
- C. it is easier to calculate the sampling errors involved.
- D. data collection cost is reduced.

Convenience samples are often used because they are quick (but maybe not accurate).

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

69. To measure satisfaction with its cell phone service, AT&T takes a stratified sample of its customers by age, gender, and location. Which is an advantage of this type of sampling, as opposed to other sampling methods?

A. It is less intrusive on customers' privacy.

B. It does not require random numbers.

C. It gives faster results.

D. It can give more accurate results.

Stratified sampling can yield more complete and accurate information.

*AACSB: Diversity*

*Blooms: Analyze*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

70. An accounting professor wishing to know how many MBA students would take a summer elective in international accounting did a survey of the class she was teaching. Which kind of sample is this?

- A. Simple random sample
- B. Cluster sample
- C. Systematic sample
- D. Convenience sample

She may bias the estimate because only accounting students were surveyed.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

71. A binary variable (also called a dichotomous variable or dummy variable) has:

- A. only two possible values.
- B. continuous scale values.
- C. rounded data values.
- D. ordinal or interval values.

Binary variables are used in every field of business to code qualitative (nominal) data.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

72. A population has groups that have a small amount of variation within them, but large variation among or between the groups themselves. The proper sampling technique is:

A. simple random.

B. stratified.

C. cluster.

D. judgment.

Identifiable strata call for stratified sampling if you can afford the extra time and cost.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 3 Hard*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*



73. A manager chose two people from his team of eight to give an oral presentation because she felt they were representative of the whole team's views. What sampling technique did she use in choosing these two people?

- A. Convenience
- B. Simple random
- C. Judgment
- D. Cluster

Expert judgment may be better than just pointing a finger (we hope).

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

74. Sampling bias can best be reduced by:

- A. using appropriate data coding.
- B. having a computer tabulate the results.
- C. utilizing random sampling.
- D. taking a judgment sample.

Sampling *error* can't be eliminated, but sampling *bias* can be avoided.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

75. A sampling technique used when groups are defined by their geographical location is:

- A. cluster sampling.
- B. convenience sampling.
- C. judgment sampling.
- D. random sampling.

Strata based on location can be targeted through cluster sampling.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

76. If we choose 500 random numbers using Excel's function =RANDBETWEEN(1,99), we would *most likely* find that:

- A. numbers near the mean (50) would tend to occur more frequently.
- B. numbers near 1 and 99 would tend to occur less frequently.
- C. some numbers would occur more than once.
- D. the numbers would have a clear pattern.

On average, we'd expect each number to occur around five times.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

77. A problem with nonrandom sampling is that:

- A. larger samples need to be taken to reduce the sampling error inherent in this approach.
- B. not every item in the population has the same chance of being selected, as it should.
- C. it is usually more expensive than random sampling.
- D. it generally provides lower response rates than random sampling.

Only random sampling gives every item the same chance to be picked.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

78. From its 32 regions, the FAA selects 6 regions, and then randomly audits 25 departing commercial flights in each region for compliance with legal fuel and weight requirements. This is an example of:

- A. simple random sampling.
- B. stratified random sampling.
- C. cluster sampling.
- D. judgment sampling.

Two-stage cluster sampling is being used (a special form of stratification).

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

79. Which of the following is a *correct* statement?

- A. Choosing the third person listed on every fifth page of the phone book is stratified sampling.
- B. An advantage of a systematic sample is that no list of enumerated data items is required.
- C. Convenience sampling is used to study shoppers in convenience stores.
- D. Judgment sampling is an example of true random sampling.

Review the sampling methods and their characteristics.

*AACSB: Analytic*

*Blooms: Analyze*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

80. Which of the following is *false*?

- A. Sampling error is the difference between the true parameter and a random number in Excel.
- B. Sampling error is a result of unavoidable random variation in a sample.
- C. A sampling frame is used to help identify the target population in a statistical study.
- D. The target population must first be defined by a full list or data file of individuals.

Review the terminology of sampling.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 02-06 Use the correct terminology for samples and populations.*

*Topic: Sampling Concepts*

81. 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 sample.

Sampling without replacement avoids redundancy, yet nonreplacement is biased.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*



82. Which method is likely to be used by a journalism student who is casually surveying opinions of students about the university's cafeteria food for an article that she is writing?

- A. Simple random sample
- B. Systematic random sample
- C. Cluster sample
- D. Convenience sample

Quick and easy may trump true random sampling for a busy journalist.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

83. Which of the following is *false*?

- A. Mail surveys are cheap but have low response rates.
- B. Coverage error is when respondents give untruthful answers.
- C. Focus groups are nonrandom but can probe issues more deeply.
- D. Surveys posted on popular websites suffer from selection bias.

Coverage error is when you miss some segment of the target population.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 02-09 Describe basic elements of survey design; survey types; and sources of error.*

*Topic: Surveys*

84. Which is a time series variable?

- A. VISA balances of 30 students on December 31 of this year
- B. Net earnings reported by Xena Corp. for the last 10 quarters
- C. Dollar exchange rates yesterday against 10 other world currencies
- D. Titles of the top 10 movies in total revenue last week

If  $x_1, x_2, \dots, x_n$  do not refer to  $n$  time periods, it isn't a time series.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 02-03 Explain the difference between time series and cross-sectional data.*

*Topic: Level of Measurement*

85. An *observation* in a data set would refer to:

- A. only a variable whose value is recorded by visual inspection.
- B. a data item whose value is numerical (as opposed to categorical).
- C. a single row that contains one or more observed variables.
- D. the values of all the variables in the entire data set.

We usually put observations in *rows* on a spreadsheet, while each *column* is a variable.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-01 Use basic terminology for describing data and samples.*

*Topic: Definitions*

86. A *multivariate* data set contains:

- A. more than two observations.
- B. more than two categorical variables.
- C. more than two variables.
- D. more than two levels of measurement.

When you have more than two variables it is multivariate data.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

87. The Centers for Disease Control and Prevention (CDC) wants to estimate the average extra hospital stay that occurs when heart surgery patients experience postoperative atrial fibrillation. They divide the United States into nine regions. In each region, hospitals are selected at random within each hospital size group (small, medium, large). In each hospital, heart surgery patients are sampled according to known percentages by age group (under 50, 50 to 64, 65 and over) and gender (male, female). This procedure combines which sampling methods?

- A. Systematic, simple random, and convenience
- B. Convenience, systematic, and judgment
- C. Cluster, stratified, and simple random
- D. Judgment, systematic, and simple random

Identifiable strata were sampled, but also random within strata and regional clusters.

88. Which statement is correct?

- A. Selecting every fifth shopper arriving at a store will approximate a random sample of shoppers.
- B. Selecting only shoppers who drive SUVs is a stratified sampling method.
- C. A census is preferable to a sample for most business problems.
- D. Stratified samples are usually cheaper than other methods.

Done carefully, systematic sampling is close to random when there is no list.

*AACSB: Analytic*

*Blooms: Evaluate*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

89. Which is a categorical variable?

- A. The brand of jeans you usually wear
- B. The price you paid for your last pair of jeans
- C. The distance to the store where you purchased your last pair of jeans
- D. The number of pairs of jeans that you own

Categories have only names (e.g., Calvin Klein).

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

90. Which is a discrete variable?

- A. The time it takes to put on a pair of jeans
- B. The price you paid for your last pair of jeans
- C. The distance to the store where you purchased your last pair of jeans
- D. The number of pairs of jeans that you own

The "number of" anything is discrete numerical data.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-02 Explain the distinction between numerical and categorical data.*

*Topic: Definitions*

91. A section of the population we have targeted for analysis is:

- A. a statistic.
- B. a frame.
- C. a sample.
- D. a coven.

We must define the segment we want to look at (e.g., independent voters).

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 02-06 Use the correct terminology for samples and populations.*

*Topic: Sampling Concepts*

## Short Answer Questions

92. Which survey method would you recommend to survey opinions of airline passengers about the cleanliness of the restrooms in the Detroit airport? Why not the others?

Restroom users are usually in a hurry and do not wish to talk to anyone while entering or leaving the facility, so direct observation or handout surveys would not work. A questionnaire could be e-mailed or mailed to a sample of frequent flyers. No telephone surveys because people would distrust the call. A web survey would have nonresponse bias.

Feedback: This is a difficult sampling problem. Restroom users are usually in a hurry and do not wish to talk to anyone while entering or leaving the facility. Thus, direct observation or handout surveys would not work. Perhaps a questionnaire could be e-mailed or mailed to a sample of frequent flyers who departed or arrived at this airport in a recent month, if a major airline were willing to cooperate. This assumes that frequent flyers are a reasonable target population. You would probably not use a telephone survey because people would distrust the call. A web survey would have nonresponse bias (i.e., respondents would probably be those with a gripe). Students may digress into sampling methods (random, systematic, cluster, stratified) instead of survey types. Ingenious students may propose other novel methods of sampling opinions.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 3 Hard*

*Learning Objective: 02-09 Describe basic elements of survey design; survey types; and sources of error.*



93. What kind of sampling method would you suggest in order to tabulate the number of formulas on a typical page of the Doane-Seward textbook? Defend your choice.

Pages are numbered so a simple random sample would be easy, or a systematic sample (e.g., every 20<sup>th</sup> page starting at page 17). Case could be made for cluster or stratified samples (e.g., by chapter or topic).

Feedback: Since the pages are numbered, a simple random sample would be quite easy. Have Excel print  $n$  random integers between 001 and 773 (or whatever the length of the book is). You would want to exclude the table of contents, appendixes, indexes, and so on). Another good choice would be a systematic sample (e.g., every 20<sup>th</sup> page starting at page 17) or a variation such as every page divisible by 20. These methods would be unbiased. Possible cases could be made for cluster or stratified samples (e.g., by chapter or topical area), but these might offer little gain.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*

94. How would you design a study to see whether drivers using hands-free cell phones are distracted enough to slow their reactions to emergency situations? How would you collect data?

No observation of drivers (too dangerous). Tests using a simulator would permit data to be collected automatically and would permit stratified sampling by driver characteristics (e.g., age group, gender, cell phone type).

Feedback: Don't use direct observation of drivers (too dangerous). Tests using a simulator would permit data to be collected automatically on reaction times to emergencies. This would permit stratified sampling by driver characteristics (e.g., age group, gender, cell phone type). Many answers are possible. The emphasis should be on how carefully the student has thought about the question. Beware of simplistic answers or impossible data collection schemes.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 3 Hard*

*Learning Objective: 02-09 Describe basic elements of survey design; survey types; and sources of error.*

*Topic: Surveys*

95. Explain the concept of a focus group. In what ways does a focus group resemble a survey? Why is a moderator desirable? What else is required to make a successful focus group?

Data collected in a focus group are richer in qualitative details and may contain information that would be missed in a survey. A trained moderator can help keep the group on track and manage interpersonal issues that may arise.

Feedback: Data collected in a focus group are richer in qualitative details, and may contain information that would be missed in a survey. Yet a focus group is like a survey in that it seeks to extract useful information and patterns from individuals. Participants are not chosen completely at random, but rather are selected to represent different backgrounds and diverse viewpoints of interest to the researchers. A well-trained moderator can help keep the group on track and manage interpersonal issues that may arise.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 2 Medium*

*Learning Objective: 02-07 Explain the common sampling methods and how to implement them.*

*Topic: Sampling Methods*