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Chapter 2 Homework



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1. Define research question.
2. Define population.
3. Define sample.
4. Has the average student loan debt for recent college graduates increased since 2015? To answer this question, one thousand recent graduates with student loan debt were sampled and the average student loan debt was determined. Identify the research question, population and sample.
5. Has the percentage of people who subscribe to the town's newspaper decreased in the past decade? To answer this question, data was collected from 350 town residents and the percentage of those who subscribe to the town's newspaper was recorded. Identify the research question, population and sample.
6. True or False. In a sense, statistics is the "study of samples". Thus, researchers use sample information to make inferences about the population.
7. True or False. Samples should be random and representative.
8. Define simple random sample.
9. Define stratified sample.
10. Define cluster sample.
11. Define systematic sample.
12. Define convenience sample.
13. Determine the sampling technique used.
 - a) Every 10th bottle is randomly selected to be analyzed.
 - b) The first 100 students who enter the football stadium are selected to participate in a study.
 - c) At a state college, all students from 3 randomly selected classrooms are asked to give their opinion regarding the cost of tuition.



- d) A farmer divides his farm into 4 subsections. Randomly selected produce from each section are tested.
- 14. Define nonresponse bias.
- 15. Define response bias.
- 16. Define undercoverage bias.
- 17. Determine whether the variable is qualitative or quantitative.
 - a) Income
 - b) Occupation
 - c) Political affiliation
 - d) Cell phone carrier
 - e) Age
- 18. Determine whether the variable is discrete or continuous.
 - a) Time
 - b) Miles
 - c) Number of lamps
 - d) Number of people at a movie theater
 - e) Weight
- 19. Name the four types of data collection techniques.
- 20. Researchers performed a study to determine if there was a correlation between smoking cigarettes and cancer. Determine whether an observational study or experiment was performed.
- 21. To determine the effectiveness of a natural supplement, researchers provided the natural supplement to 40 subjects and a placebo to another 40 subjects. After 3 months, the effectiveness of the supplement was analyzed. Determine whether an observational study or experiment was performed.
- 22. Define blinding.
- 23. Define double-blinding.
- 24. True or False. Causal statements can be made with experimental studies because the situation is controlled and all aspects are equal other than the treatment.



25. True or False. Causal statements cannot be made with observational studies because the testing situation is not controlled. Thus, only observations are made.



Answers

1. Research question: a clearly-defined question researchers would like to answer.
2. Population: all subjects of interest.
3. Sample: a subset of the population.
4. Research question: Has the average student loan debt for recent college graduates increased since 2015?
Population: all recent graduates with student loan debt. Sample: one thousand recent graduates with student loan debt.
5. Research question: Has the percentage of people who subscribe to the town's newspaper decreased in the past decade? Population: all town residents. Sample: 350 town residents.
6. True
7. True
8. Simple Random Sample: a sample in which each subject of the population has an equal chance of being selected.
9. Stratified Sample: a sample in which subjects of the population are first divided into strata, then subjects are randomly selected from each stratum.
10. Cluster Sample: a sample in which clusters of subjects are randomly selected from the population.
11. Systematic Sample: a sample in which every x^{th} subject of the population is randomly selected.
12. Convenience Sample: a sample in which the subjects of the population are selected conveniently.
13. a) systematic sampling, b) convenience sampling, c) cluster sampling, d) stratified sampling
14. Nonresponse Bias: bias that occurs when subjects do not respond to a questionnaire (survey) or cannot be contacted.
15. Response Bias: bias that occurs when a question is poorly worded or when an interviewer can influence the subjects' response.



16. Undercoverage Bias: bias that occurs when representative subjects are not included in the sample selection process.
17. a) quantitative, b) qualitative, c) qualitative, d) qualitative, e) quantitative
18. a) continuous, b) continuous, c) discrete, d) discrete, e) continuous
19. A personal interview, a mailed questionnaire, direct observation and a survey of records.
20. Observational study
21. Experiment
22. Blinding: a technique where the subjects do not know whether they received the treatment or placebo.
23. Double-Blinding: a technique where neither the subjects nor the experimenter(s) know which subjects received the treatment or placebo.
24. True
25. True

