Statistics - Unlocking the Power of Data 4th edition Lock Test Bank

SKU: 9781394336623-TEST-BANK

Statistics - Unlocking the Power of Data, 3e **(Lock)**
Chapter 1 Collecting Data

1.1 The Structure of Data

Use the following to answer the questions below:

A high school senior is collecting data on the colleges in which she is interested. Identify the variables as either categorical or quantitative.

1) *Type of college*: Private or Public college
Answer: Categorical
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

2) *Tuition*: in thousands of dollars
Answer: Quantitative
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

3) *State*: the state in which the college is located
Answer: Categorical
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

4) *Zip Code*: the zip code of the part of the country in which the college is located
Answer: Categorical
Diff: 2 Type: SA Var: 1
L.O.: 1.1.2

5) *Enrollment*: the number of students enrolled at the college
Answer: Quantitative
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

6) *Student-Faculty Ratio*: the number of students divided by the number of faculty
Answer: Quantitative
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

7) *Graduation Rate*: as a percentage
Answer: Quantitative
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

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Use the following to answer the questions below:

A high school senior is collecting data on the colleges in which she is interested, including the following variables: *Type of college, Tuition, State, Enrollment, Student-Faculty Ratio, Graduation Rate*

8) What are the cases in the high school senior's dataset?
A) Colleges
B) Tuition
C) Graduation Rate
D) State
Answer: A
Diff: 2 Type: BI Var: 1
L.O.: 1.1.1

9) Refer to the variables collected by the high school senior looking at colleges. Identify a question we might ask about any one of these individual variables.
Answer: Answers will vary. Some possible answers include:
Type of college: Is she considering more private schools than public schools?
Tuition: What is the average tuition of the colleges she is considering? What is the "cheapest" school she is considering? What is the most expensive school she is considering?
State: Is there a state that she seems to prefer?
Enrollment: What is the average size of the colleges she is considering? What is the largest college she is considering? What is the largest college she is considering?
Student-Faculty Ratio: What is the average SF ratio for the schools she is considering? What is the smallest SF ratio for the schools she is considering? What is the largest SF ratio for the schools she is considering?
Graduation Rate: What is the average graduation rate for the schools she is considering? What is the lowest graduation rate for the schools she is considering? What is the highest graduation rate for the schools she is considering?
Diff: 2 Type: ES Var: 1
L.O.: 1.1.4;1.1.5

10) Refer to the variables collected by the high school senior looking at colleges. Identify a question that we might ask about relationships between any two (or more) of these variables.
Answer: Answers will vary. Some possible answers include:
Which type of schools tend to cost more, the private or the public schools?
Which type of schools tend to have the higher graduation rate, the private or public schools?
Which type of schools tend to have the lower student-faculty ratio, the private or public schools?
Which state is the most expensive?
Can student-faculty ratio be used to predict tuition?
Can graduation rate be used to predict tuition?
Can enrollment be used to predict tuition?
Diff: 2 Type: ES Var: 1
L.O.: 1.1.4;1.1.5

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Use the following to answer the questions below:

A realtor's website provides information on area homes that are for sale. Identify each of the variables as either categorical or quantitative.

11) *List Price*: amount, in thousands of dollars, for which the house is being sold
Answer: Quantitative
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

12) *School District*: the school district in which the home is located
Answer: Categorical
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

13) *Size*: in square feet
Answer: Quantitative
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

14) *Style*: the style of home (ranch, Cape Cod, Victorian, etc.)
Answer: Categorical
Diff: 1 Type: SA Var: 1
L.O.: 1.1.2

Use the following to answer the questions below:

A realtor's website provides information on area homes that are for sale, including the following variables: *List Price*, *School District*, *Size*, *Style.*

15) What are the cases in the realtor's dataset?
A) Individual houses
B) List Price
C) Size
D) Style
Answer: A
Diff: 2 Type: BI Var: 1
L.O.: 1.1.1

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16) Refer to the variables provided by the realtor. Identify a question we might ask about any one of these individual variables.
Answer: Answers will vary. Some possible answers include:
List Price: What is the average list price of homes for sale in the area? What is the least expensive home for sale in the area? What is the most expensive home for sale in the area?
School District: In which school district are most of the homes located?
Size: What is the average size of homes for sales in the area? What is the largest home for sale in the area? What is the smallest home for sale in the area?
Style: What style of home is most popular (or for sale the most) in this area?
Diff: 2 Type: ES Var: 1
L.O.: 1.1.4;1.1.5

17) Refer to the variables provided by the realtor. Identify a question that we might ask about relationships between any two (or more) of these variables.
Answer: Answers will vary. Some possible answers include
Does the price of the home depend on the school district (i.e., does one tend to cost more than others?)?
Which style of home tends to cost the most?
Do larger homes tend to cost more than smaller homes?
Diff: 2 Type: ES Var: 1
L.O.: 1.1.4;1.1.5

Use the following to answer the questions below:

The USStates dataset, used throughout the textbook, contains information on the 50 U.S. states. A small segment from the dataset is displayed in the following table.

State	Percent of Residents with a College Degree
⋮	⋮
California	34.5
Colorado	39.6
Connecticut	42.7
⋮	⋮

18) What are the cases in this dataset?
A) States
B) Percent of residents with a college degree
C) Residents
D) USStates dataset
Answer: A
Diff: 1 Type: BI Var: 1
L.O.: 1.1.1

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19) What variable from this dataset is displayed? Is it categorical or quantitative?
A) Variable = Percent of state residents with a college degree. This is a quantitative variable.
B) Variable = Percent of state residents with a college degree. This is a categorical variable.
C) Variable = State. This is a quantitative variable.
D) Variable = State. This is a categorical variable.
Answer: A
Diff: 1 Type: BI Var: 1
L.O.: 1.1.1;1.1.2

20) Data from the state of Connecticut were used to determine that 42.7% of state residents had a college degree. What were the cases from Connecticut used to arrive at this figure?
A) Residents of Connecticut
B) The state of Connecticut
C) 42.7 percent of the Connecticut residents with a college degree
D) The residents of California, Colorado, and Connecticut
Answer: A
Diff: 3 Type: BI Var: 1
L.O.: 1.1.1

21) What variable was used to determine that 42.7% of Connecticut state residents have a college degree? Is it categorical or quantitative?
A) Variable = whether or not they have a college degree. This is a categorical variable.
B) Variable = whether or not they have a college degree. This is a quantitative variable.
C) Variable = what state they are from. This is a categorical variable.
D) Variable = what state they are from. This is a quantitative variable.
Answer: A
Diff: 3 Type: BI Var: 1
L.O.: 1.1.1;1.1.2

22) The _____ variable is used to understand or predict values of the _____ variable.
A) Blank 1 = Explanatory, Blank 2 = Response
B) Blank 1 = Response, Blank 2 = Explanatory
C) Blank 1 = Categorical, Blank 2 = Quantitative
D) Blank 1 = Quantitative, Blank 2 = Categorical
Answer: A
Diff: 2 Type: BI Var: 1
L.O.: 1.1.3

1.2 Sampling from a Population

1) A population includes all individuals or objects of interest.
Answer: TRUE
Diff: 1 Type: TF Var: 1
L.O.: 1.2.1

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2) A population is a subset of the sample.
Answer: FALSE
Diff: 1 Type: TF Var: 1
L.O.: 1.2.1

3) A biased sample is one that does not accurately reflect or represent the population.
Answer: TRUE
Diff: 1 Type: TF Var: 1
L.O.: 1.2.0

Use the following to answer the questions below:

State whether the data are best described as a population or a sample.

4) The makers of M&M's state that when they package their candies they thoroughly mix the colored candies together and randomly put them into packages. A student purchases a bag of Milk Chocolate M&M's from the vending machine.
A) Sample
B) Population
Answer: A
Diff: 1 Type: BI Var: 1
L.O.: 1.2.1

5) A professor wants to schedule a review session for an exam. He asks all students enrolled in the course their preferred time, and they all respond.
A) Population
B) Sample
Answer: A
Explanation: Population - he collects data from everyone enrolled in the course
Diff: 2 Type: BI Var: 1
L.O.: 1.2.1

6) A researcher has identified a beach with a substantial number of driftwood logs. She randomly chooses 30 logs and takes core samples from those logs.
A) Sample
B) Population
Answer: A
Explanation: Sample. She has only measured a subset of all of the logs on the beach.
Diff: 2 Type: BI Var: 1
L.O.: 1.2.1

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7) A football fan recorded the number of rushing yards for all NFL running backs who played last season.
A) Population
B) Sample
Answer: A
Explanation: Population. The data were collected on all of the running backs.
Diff: 2 Type: BI Var: 1
L.O.: 1.2.1

Use the following to answer the questions below:

A tree enthusiast is interested in estimating the typical length of oak tree leaves. He chooses 30 leaves from the oak tree in his backyard.

8) What is the sample in this situation?
Answer: 30 leaves selected from this oak tree
Diff: 2 Type: ES Var: 1
L.O.: 1.2.1

9) What is the population in which the tree enthusiast is interested?
Answer: All oak tree leaves
Diff: 2 Type: ES Var: 1
L.O.: 1.2.1

10) Is this a biased sampling strategy?
A) Yes
B) No
Answer: A
Explanation: This is a biased sampling strategy as he is only taking the leaves from one tree; there could be something unusual about that tree. At best we can generalize to the leaves on the tree in his backyard.
Diff: 2 Type: MC Var: 1
L.O.: 1.2.2;1.2.3

In each situation, indicate whether the method of data collection is biased.

11) Ask the students at the gym on a Tuesday afternoon how many hours a week they work out to estimate the average amount of time students at the university work out.
A) Biased
B) Not biased
Answer: A
Explanation: Biased, because only students at the gym (who are likely working out) were sampled. Students who don't go to the gym (and thus possibly don't work out) were not included in the sample. Another potential source of bias is that, for various reasons, the students asked the question may exaggerate about the amount of time they work out each week.
Diff: 1 Type: BI Var: 1
L.O.: 1.2.2;1.2.3;1.2.4;1.2.5

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12) A professor asks her class of first year students if any of them consumed alcohol over the weekend.
A) Biased
B) Not biased
Answer: A
Explanation: This sample is likely biased. First year students would tend to be under the age of 21, and thus it would be illegal for them to be consuming alcohol. They might not want to truthfully tell their professor about engaging in an illegal behavior.
Diff: 1 Type: BI Var: 1
L.O.: 1.2.2;1.2.3;1.2.4;1.2.5

13) A campus bookstore is holding a drawing to give away five free textbooks (one per student). Students enter the contest by writing their name and contact information on an index card. The index cards were placed in a bowl, thoroughly mixed around, and five cards were selected. Those five students were contacted and received their free textbook.
A) Not biased
B) Biased
Answer: A
Explanation: This is a non-biased sample of the students who entered the contest (the population in this situation is the student who entered the contest).
Diff: 3 Type: BI Var: 1
L.O.: 1.2.2;1.2.3;1.2.4

14) A professor is considering a new textbook for her introductory statistics class. She wants to choose a book that emphasizes graphing data. A book that she is considering has 530 pages. To estimate the proportion of pages in the book that have displays of data, she randomly generates 20 numbers between 1 and 530. She then records whether or not each selected page contains displays of data.
A) Not biased
B) Biased
Answer: A
Explanation: Her pages were selected by generating random numbers. This is an unbiased sampling method.
Diff: 1 Type: BI Var: 1
L.O.: 1.2.2;1.2.3;1.2.4

15) A reporter from the campus newspaper is writing an article about student opinions on Greek organizations (sororities and fraternities). For his article, he visits all of the Greek houses on campus and interviews a random sample of residents of each house.
A) Biased
B) Not biased
Answer: A
Explanation: His sample only contains individuals who have chosen to participate in Greek life, and this the opinions will be biased towards the individuals who choose to belong to a Greek organization.
Diff: 1 Type: BI Var: 1
L.O.: 1.2.2;1.2.3;1.2.4

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1.3 Experiments and Observational Studies

Use the following to answer the questions below:

A group of researchers investigated the effect of media usage (whether or not subjects watch television or use the Internet) in the bedroom on "Tiredness" during the day (measured on a 50 point scale).

1) Identify the variables described and whether they are categorical or quantitative.
A) Media usage in the bedroom = Categorical; "Tiredness" = Quantitative
B) Media usage in the bedroom = Quantitative; "Tiredness" = Categorical
C) Media usage in the bedroom = Categorical; "Tiredness" = Categorical
D) Media usage in the bedroom = Quantitative; "Tiredness" = Quantitative
Answer: A
Diff: 2 Type: BI Var: 1
L.O.: 1.1.2

2) Identify the variables as either explanatory or response variables.
A) Media usage in the bedroom = Explanatory; "Tiredness" = Response variable
B) Media usage in the bedroom = Response variable; "Tiredness" = Explanatory
C) Media usage in the bedroom = Explanatory; "Tiredness" = Explanatory
D) Media usage in the bedroom = Response variable; "Tiredness" = Response variable
Answer: A
Diff: 1 Type: BI Var: 1
L.O.: 1.1.3

3) To collect these data, the researchers randomly selected homes to visit and interviewed the adult member of the household whose birthday was nearest. Is this an experiment or an observational study?
A) Observational study
B) Experiment
Answer: A
Explanation: This is an observational study because treatments are not being applied to the study participants; they are being asked about their normal behaviors.
Diff: 1 Type: BI Var: 1
L.O.: 1.3.3

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4) Suppose that the researchers found that the individuals who use media in the bedroom tended to be more tired during the day than those who do not. Would it be appropriate for the researchers to conclude that using media in the bedroom causes tiredness during the day?
A) Yes
B) No
Answer: B
Explanation: No, it would not be appropriate to make a claim about a causal relationship between media usage in the bedroom and tiredness because this is an observational study. It could be the case that the individuals used media in the bedroom because they couldn't sleep, and they were tired because of their inability to sleep. An experiment needs to be conducted to show a cause-and-effect relationship between two variables.
Diff: 2 Type: BI Var: 1
L.O.: 1.3.1;1.3.2;1.3.4

5) Association implies causation.
Answer: FALSE
Diff: 1 Type: TF Var: 1
L.O.: 1.3.1

6) In elementary school (Grades 1 through 6) there is a strong association between a child's height and reading ability. What is a possible confounding variable that would help explain this relationship? Explain briefly.
Answer: Age/grade is a possible confounding variable. Older students (who tend to be in the higher grades) tend to be taller than the younger students (in the lower grades). The older students should also be better readers than the younger students.
Diff: 2 Type: ES Var: 1
L.O.: 1.3.2

7) A sample of college age students shows an interesting association between hair length (in inches) and height (also in inches). On average, shorter students tend to have longer hair. What is a possible confounding variable that would help explain this relationship?
A) Gender
B) Age
C) Grade point average
D) Local fashion preferences
Answer: A
Explanation: Gender is a possible confounding variable. We are looking at students in general, which can be either male or female. Females tend to be shorter than males, and females tend to have longer hair than males.
Diff: 2 Type: BI Var: 1
L.O.: 1.3.2

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Use the following to answer the questions below:

A recent study investigated the impact of psychological stress on men's judgments of female body size. The men were randomly assigned to one of two groups; one group was assigned to participate in a stressful task while the other group did not take part in the task. Then the men were asked to rate the attractiveness of female bodies varying in size from emaciated to obese.

8) What are the cases in this study?
Answer: Men
Diff: 2 Type: SA Var: 1
L.O.: 1.1.1

9) Is this an experiment or an observational study?
A) Experiment
B) Observational study
Answer: A
Explanation: This is an experiment because the men were assigned, at random, to one of two treatments (stressful task or not). Because their normal behavior was modified, this is not an observational study.
Diff: 1 Type: BI Var: 1
L.O.: 1.3.3

10) Identify the explanatory variable in this experiment.
A) Type of task (stressful or not)
B) Rating of the attractiveness of the female body sizes
Answer: A
Diff: 1 Type: BI Var: 1
L.O.: 1.1.3

11) Identify the response variable in this experiment.
A) Type of task (stressful or not)
B) Rating of the attractiveness of the female body sizes
Answer: B
Diff: 1 Type: BI Var: 1
L.O.: 1.1.3

12) Is a control group used in this experiment?
A) Yes
B) No
Answer: A
Explanation: Yes, a control group is used. The group that did not participate in the stressful task is the control group.
Diff: 1 Type: MC Var: 1
L.O.: 1.3.0

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Use the following to answer the questions below:

Identify whether each of the following scenarios describe a randomized comparative experiment or a matched pairs experiment.

13) To study the impact of texting while driving, researchers have students drive around an obstacle course twice, once while texting and once without texting (the order of which was randomized). Their score for each turn is the number of obstacles they successfully maneuvered around.
Answer: Matched pairs
Diff: 1 Type: SA Var: 1
L.O.: 1.3.6

14) Studies have shown that multi-tasking typically results in lower productivity. However, some people believe that individuals who play video games are better at multi-tasking. To investigate this, 28 video game players were randomly assigned to one of two groups. One group was assigned to play a video game that involved driving a car around a track. The other group was assigned to play the same video game while simultaneously answering unrelated trivia questions over the phone.
Answer: Randomized Comparative Experiment
Diff: 1 Type: SA Var: 1
L.O.: 1.3.6

15) To study the effect of classical music on concentration, 26 math majors were assigned at random into two groups. Subjects in one group listened to classical music while trying to solve a hard Sudoku puzzle, while the subjects in the other group solved the same puzzle in a silent room. The time it took each student to finish was recorded.
Answer: Randomized Comparative Experiment
Diff: 1 Type: SA Var: 1
L.O.: 1.3.6

16) On their website, the makers of Cold-EEZE lozenges provide links to studies done to demonstrate the effectiveness of their product at shortening the duration of the common cold. One study, published in the *Annals of Internal Medicine*, is described as a "randomized, double-blind, placebo-controlled" study. Briefly explain what the phrase "randomized, double-blind, placebo-controlled" means.
Answer: "Randomized" means that the subjects in the experiment were randomly assigned to the different treatments. Since this was a "placebo-controlled" experiment, one of the treatments was the Cold-EEZE lozenge while the other was a lozenge not believed to have any effect on the duration of a cold. "Double-blind" means that neither the subjects nor the individuals evaluating them knew which treatment the subjects were receiving; to ensure that this could happen, both the Cold-EEZE lozenge and the placebo need to be administered in the same way and be otherwise indistinguishable.
Diff: 2 Type: ES Var: 1
L.O.: 1.3.5

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