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Name:_____ Class:_____ Date:_____

Chapter 1 - Collecting Data

1. The following describes different variables about popular social media applications:

Social Media Application	Number of Users (in billions)	Privately Held	Headquarter Location	Average Use Per Day (in minutes)
PicsOnly	2.35	Yes	California	29
PoliticalCentral	2.99	Yes	California	35
HipVid	1.67	Yes	Beijing	95
Vid with Friends	1.2	Yes	California	30

Which of the following is a variable?

a. PrivatelyHeld
b. PicsOnly
c. California
d. 2.99 billion

ANSWER: a

2. The following describes different variables about popular social media applications:

Social Media Application	Number of Users (in billions)	Privately Held	Headquarter Location	Average Use Per Day (in minutes)
PicsOnly	2.35	Yes	California	29
PoliticalCentral	2.99	Yes	California	35
HipVid	1.67	Yes	Beijing	95
Vid with Friends	1.2	Yes	California	30

Which would be classified as a quantitative variable?

a. Vid with Friends
b. 2.99 billion
c. Average Use Per Day (in minutes)
d. Headquarter Location

ANSWER: c

3. The following describes different variables about popular social media applications:

Social Media Application	Number of Users (in billions)	Privately Held	Headquarter Location	Average Use Per Day (in minutes)
PicsOnly	2.35	Yes	California	29

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PoliticalCentral	2.99	Yes	California	35
HipVid	1.67	Yes	Beijing	95
Vid with Friends	1.2	Yes	California	30

Which would be a categorical variable?

a. Number of Users (in billions)
b. Headquarter Location
c. PicsOnly
d. 35 minutes

ANSWER: b

4. What is the difference between a population and a sample?
a. A population is a smaller subset of a larger group, while a sample is the entire group we want information about.
b. A population is a collection of individuals, while a sample is a statistical measure.
c. A population includes the entire group we want information about, while a sample is a subset of individuals in the population from which we collect data.
d. A population is a quantitative representation of a group we want information about, while a sample is a categorical representation of the same group.

ANSWER: c

5. Which of the following is a categorical variable?
a. Age
b. Zip code
c. Temperature
d. Height

ANSWER: b

6. Ten doctors who share an office are considering whether they should open earlier for the 500 patients they serve. The front office decides to poll a total of 100 patients to find out their opinion on earlier hours. What is the sample in this scenario?
a. 100 doctors
b. 100 patients
c. 10 doctors
d. 500 patients

ANSWER: b

7. A multinational technology company would like to know which benefit plan employees would most likely choose when newly hired. Which would be the best way to obtain an unbiased sample?
a. Survey a random sample of new hires.
b. Have a suggestion box present during orientation.

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c. Create a leadership team among the new hires to collect their opinions.
d. Email new hires to solicit their choices voluntarily.

ANSWER: a

8. You are hoping to keep the school dining hall open for longer periods of time, so you create a survey to send to students asking their thoughts on the dining hall. Which question is the LEAST biased?
a. Should the dining hall change its hours of operation?
b. Do you believe the dining hall should accommodate athletes since they are bringing in money for the school?
c. Do you think the dining hall should continue with its current extremely limited hours?
d. Do you feel the dining hall should cater to those who choose early morning classes since they are more motivated?

ANSWER: a

9. A software company emails a random sample of employees to poll them about their vacation preferences. New employees are underrepresented; they could not be contacted since they do not have access to their new employee emails yet. This is an example of
a. stratified sampling bias.
b. nonresponse bias.
c. response bias.
d. undercoverage bias.

ANSWER: d

10. Which of the following questions is biased?
a. Do you prefer mindlessly scrolling Instagram or watching the nightly news?
b. Should the school adopt a dress code?
c. How satisfied are you with your internet provider?
d. Do you like to go on international vacations?

ANSWER: a

11. Graham has accidentally made a typo on one of his survey questions which changes the meaning of the question entirely. This will most likely lead to what source of bias?
a. response bias
b. nonresponse bias
c. undercoverage bias
d. convenience sample bias

ANSWER: a

12. Ayla needs 50 people to join her survey about school lunches. She decides to send a mass email to her entire school and offers a $10 gift card to the first 50 people who join. What is a potential issue with how Ayla has designed her study?
a. There will likely be response bias.

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b. There will likely be nonresponse bias.
c. Ayla used a convenience sample, which can lead to bias in the results.
d. Ayla used a voluntary response sample, which can lead to bias in the results.

ANSWER: d

13. The fact that different random samples of the same size from the same population produce different estimates is called
a. sampling variability.
b. simple random sampling.
c. a census.
d. response bias.

ANSWER: a

14. A professor has a class of 200 students, and she takes 10 samples that each consist of 15 students' test scores. She examines the mean for each of the 10 samples. What should she see?
a. Each mean will underestimate the true population mean.
b. Each mean will overestimate the true population mean.
c. The means will differ from sample to sample.
d. The means will be the same from sample to sample.

ANSWER: c

15. When we decrease the sample size, the sampling variability will
a. increase.
b. decrease.
c. stay the same.
d. either increase or decrease depending on how large the original sample was.

ANSWER: a

16. Which of the following is NOT a part of the process for selecting a simple random sample with technology?
a. Give each individual in the population a distinct integer label from 1 to N, where N is the number of individuals in the population.
b. Use a random number generator to obtain n different integers from 1 to N.
c. Choose the individuals that correspond to the randomly selected integers.
d. Select individuals with replacement.

ANSWER: d

17. A county is looking to increase its number of elementary schools. The superintendent's team randomly selects six of the nine districts in the county and sends a questionnaire asking if they feel their community would benefit from an additional elementary school. What describes this sampling plan?
a. cluster random sampling
b. stratified random sampling
c. convenience sampling

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d. simple random sampling

ANSWER: a

18. A university wants to know how students feel about the off-campus dining options. The university randomly selects one sample of 150 students with a car on campus and one sample of 150 students who do not have a car. What describes this sampling plan?

a. cluster random sampling
b. stratified random sampling
c. convenience sampling
d. simple random sampling

ANSWER: b

19. A professor wants to know how students feel about homework. She randomly selects a sample of 50 first-year students and a separate sample of 50 seniors. What describes this sampling plan?

a. cluster random sampling
b. stratified random sampling
c. convenience sampling
d. simple random sampling

ANSWER: b

20. A researcher wants to conduct a survey on employee satisfaction within a large company. The company has a database of all 12,000 employees sorted alphabetically. The researcher decides to select every 110th employee from the list to participate in the survey. This method of selection is called

a. cluster random sampling.
b. stratified random sampling.
c. systematic random sampling.
d. simple random sampling.

ANSWER: c

21. A large city is looking to add more green space. The mayor's team splits the city into 100 equal-sized sections. The mayor's team randomly selects 50 sections and sends a questionnaire to everyone who lives in the section about the addition of green space within the city. What describes this sampling plan?

a. cluster random sampling
b. stratified random sampling
c. convenience sampling
d. simple random sampling

ANSWER: a

22. Which of the following are groups of individuals in a population that share characteristics thought to be associated with variables being measured in a study?

a. strata
b. clusters

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c. census
d. categorical variables

ANSWER: a

23. A researcher at a medical research facility is looking into the association between obesity and cardiovascular disease. Which of the following may be a confounding variable in the study?
a. age
b. if an individual has diabetes
c. level of regular exercise
d. all of the above

ANSWER: d

24. A researcher used a randomized sample of adults to study cholesterol levels, and the researchers were unaware of which group the participants were placed in for the study. Participants were split into two groups using a chance process: one group met with a nutritionist to discuss ways to reduce cholesterol levels while the other group continued their normal lives. At the end of the study, the cholesterol levels were measured and the change was compared between the two groups. This represents randomized assignment because
a. the participants were selected at random.
b. cholesterol was measured at the beginning and end of the study.
c. participants were assigned to meet with a nutritionist or not (the treatment) using a chance process.
d. there were two groups.

ANSWER: c

25. A researcher used a randomized sample of adults to study cholesterol levels, and the researchers were unaware of which group the participants were placed in for the study. Participants were split into two groups using a chance process: one group met with a nutritionist to discuss ways to reduce cholesterol levels while the other group continued their normal lives. At the end of the study, the cholesterol levels were measured and the change was compared between the two groups. This study would be considered to be
a. double-blind.
b. single-blind.
c. biased.
d. a placebo.

ANSWER: b

26. What is the purpose of a control group in an experiment?
a. A control group is a treatment that has no active ingredient but is otherwise like other treatments.
b. A control group is the group that is assigned randomly to treatments.
c. A control group measures an outcome of an experiment.
d. A control group is used to provide a baseline for comparing the effects of other treatments.

ANSWER: d

27. Why is a completely randomized design important to a study?

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a. Treatment groups end up being the same size.
b. It ensures all participants receive the same treatment.
c. It will reduce bias in sampling.
d. It prevents confounding.

ANSWER: d

28. A statistics professor was interested in expected starting salaries for different majors at his university. For simplicity of the study, he grouped 100 students as either Sciences majors or Arts majors and asked if their expected starting salaries after graduation are greater or less than $50,000.

	Expected Starting Salaries		
Major	**< $50,000**	**> $50,000**	**Total**
Sciences	22	28	50
Arts	39	11	50
Total	61	39	100

What proportion of Sciences students have expected starting salaries over $50,000 after graduation? What proportion of Arts students have expected starting salaries over $50,000 after graduation? Calculate these two proportions.

a. Sciences: 0.56, Arts: 0.22
b. Sciences: 0.28, Arts: 0.11
c. Sciences: 0.42, Arts: 0.16
d. Sciences: 0.72, Arts: 0.28

ANSWER: a

29. When an observed difference in the responses between groups is so large that it is unlikely to be explained by chance variation in the random assignment, the result is said to be

a. statistically significant.
b. not statistically significant.
c. clinically significant.
d. practically significant.

ANSWER: a

30. Generally, we believe differences that would occur in less than _____ of simulated random assignments by chance alone are considered statistically significant.

a. 10%
b. 19%
c. 5%
d. 1%

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ANSWER: c

31. In a randomized controlled experiment, researchers want to investigate the effect of a new drug on blood pressure. They recruit 500 participants with high blood pressure and randomly assign them to two groups: A and B. Group A receives the new drug, while Group B receives the current gold standard treatment. To control for potential confounding variables, the researchers decide to implement blocking. Which of the following statements is true about blocking?

a. Blocking is only used in observational studies, not experimental research.
b. Blocking involves assigning participants to groups based on similar characteristics.
c. Blocking is used when the sample size for the experiment is smaller than 1,000.
d. Blocking is not necessary in this experiment because random assignment is sufficient.

ANSWER: b

32. Older and younger individuals tend to lose weight at different rates. If a researcher wanted to study a new weight loss nutrition program, age might become a variable that affects the study's main outcome. What could the researcher do to prevent this?

a. Place younger and older individuals into two blocks and assign the weight loss nutrition program randomly.
b. Randomly assign younger and older individuals into the two groups.
c. Ensure the study is double-blind.
d. Nothing can be done to prevent this.

ANSWER: a

33. A medical marijuana farm is looking at adding a new plant variety, but the farm wants to see how the new variety grows as compared to the original variety. The farm also uses two ways of growing: open air and in a greenhouse. How should the farm set up this study?

a. Create two blocks, original variety and new variety, and then assign all of one variety to either the greenhouse or open air.
b. Create two blocks, open air and greenhouse, and then randomly assign some new and old varieties of marijuana plants to each.
c. Create two blocks, open air and greenhouse, and then assign the new variety to the greenhouse and the old variety to the open air.
d. Use the old variety as the control group and then randomly assign the new variety to either the greenhouse or open air.

ANSWER: b

34. A company has claimed that its energy drink helps with concentration and wanted to gather supporting evidence. The company performed a study where 1,000 individuals were randomly assigned to drink the energy drink or receive a placebo drink. The researchers thought that height might affect the study due to a difference in metabolism. Therefore, the researchers decided to find a complementary individual for the placebo group for each individual in the experimental group and randomly assign one to each group. This is an example of what type of study design?

a. observational

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b. variability
c. cross-sectional
d. matched pairs

ANSWER: d

35. Which of the following is a true statement about a matched pairs design?
a. Blocking is a specific type of matched pairs design.
b. It is an experimental design that uses blocks of size 2.
c. Each participant must receive the same treatment.
d. Random assignment of subjects to treatments is not necessary.

ANSWER: b

36. A media streaming company that allows adults 18 and older to sign up noted that 68% of current streamers aged 18-39 own over three devices they could potentially use to stream shows at home. Could the company generalize this result to its entire streaming customer base?
a. yes
b. no
c. only if there are more customers aged 18-39 than over 39
d. only if a random sample of current streamers aged 18-39 are interviewed about their devices

ANSWER: b

37. A magazine surveyed a random sample of individuals 65 and older in the U.S. who had used a streaming service and found that 85% had used technical support services offered by a streaming service. What population could the magazine generalize this result to?
a. all streaming service customers in the U.S.
b. all customers in the U.S. who have used technical support services
c. all streaming service customers in the U.S. ages 65 and older
d. all individuals ages 65 and older

ANSWER: c

38. In an experiment, random assignment of individuals to groups allows us to
a. make an inference about the population from which the sample was selected.
b. make an inference about a different population from that which the sample was selected.
c. make an inference about cause and effect.
d. claim that the result is statistically significant.

ANSWER: c

39. Which of the following is NOT a basic principle of data ethics?
a. All planned studies must be reviewed in advance by an institutional review board charged with protecting the safety and well-being of the subjects.
b. The data of individuals may be shared when they participate in a future study.
c. All individuals who are subjects in a study must give their informed consent before data are

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collected.

d. All individual data must be kept confidential. Only statistical summaries for groups of subjects may be made public.

ANSWER: b

40. A group of researchers is interested in seeing whether texting while driving increases the risk of having an accident. They want to explore this using a well-designed experiment. What would be the problem with this type of study?

a. Only car companies are allowed to perform this type of study.

b. They should include other methods of transportation other than driving in order to get the best results.

c. It would be unethical to randomly assign an individual to text while driving.

d. There is no problem with this proposed study as long as the experiment is well-designed.

ANSWER: c

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