Introductory Statistics MyLab Revision 10th edition Weiss Test Bank

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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Provide an appropriate response.

1) The table below shows the number of new AIDS cases in the U.S. in each of the years 1989–1994.

Year	New AIDS cases
1989	33,643
1990	41,761
1991	43,771
1992	45,961
1993	103,463
1994	61,301

Classify the study as either descriptive or inferential.

A) Descriptive B) Inferential

Answer: A

2) The table below shows the average income by age group for the residents of one town in the year 1998. The average incomes for each age group are estimates based on a sample of size 100 from each group.

Age group	Average income
18–24	$17,180
25–39	$26,661
40–54	$32,471
55–70	$25,960
Over 70	$18,241

Classify the study as either descriptive or inferential.

A) Descriptive B) Inferential

Answer: B

3) The table below shows the total number of births in the U.S. and the birth rate per 1,000 population in each of the years 1990–1994.

Year	Births	Birth Rate
1990	4,158,512	16.7
1991	4,110,907	16.3
1992	4,065,014	15.9
1993	4,000,240	15.5
1994	3,979,000	15.3

Classify the study as either descriptive or inferential.

A) Descriptive B) Inferential

Answer: A

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4) Based on a random sample of 1000 people, a researcher obtained the following estimates of the percentage of people lacking health insurance in one U.S. city.

Age	Percentage not covered
18–24	28.2
25–39	24.9
40–54	19.1
55–65	16.5

Classify the study as either descriptive or inferential.

A) Descriptive B) Inferential

Answer: B

5) The table below shows the number of homicides in the U.S. in each of the years 1989–1993.

Year	Murder and non–negligent manslaughter Number of offenses
1989	21,500
1990	23,440
1991	24,700
1992	23,760
1993	24,530

Classify the study as either descriptive or inferential.

A) Descriptive B) Inferential

Answer: A

6) A researcher randomly selects a sample of 100 students from the students enrolled at a particular college. She asks each student his age and calculates the mean age of the 100 students. It is 21.3 years. Based on this sample, she then estimates the mean age of all students enrolled at the college to be 21.3 years. In what way are descriptive statistics involved in this example? In what way are inferential statistics involved?

A) When calculating the mean age of the students in the sample, the researcher is using inferential statistics. When estimating the mean age of all students at the college, the researcher is using descriptive statistics.

B) When calculating the mean age of the students in the sample, the researcher is using descriptive statistics. When estimating the mean age of all students at the college, the researcher is using inferential statistics.

Answer: B

7) A meteorologist constructs a graph showing the total precipitation in Phoenix, Arizona in each of the months of 1998. Does this involve descriptive statistics or inferential statistics?

A) Descriptive B) Inferential

Answer: A

8) Thirty of the 198 students enrolled in Statistics 101 were asked if they wanted Exam II to be a take–home or an in–class assessment. Twenty, or about 67%, of the students polled indicated a preference for an in–class exam. The professor concluded that the majority of students in Statistics 101 would prefer an in–class examination for the second assessment. Did the professor perform a descriptive study or an inferential study?

A) Descriptive B) Inferential

Answer: B

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9) A statistics student's presentation of the results of her study included many charts, graphs, and tables. Identify the kind of statistical study conducted.
A) The study was necessarily inferential.
B) The purpose of the study may have been completely descriptive or it might have been inferential.
C) The study was purely descriptive.

Answer: B

10) A news article appearing in a national paper stated that "The fatality rate from use of firearms sank to a record low last year, the government estimated Friday. But the overall number of violent fatalities increased slightly, leading the government to urge an increase in police forces in major urban areas. Overall, 15,600 people died from violent crimes in 2005, up from 15,562 in 2004, according to projections from a government source. Is the figure15,600 a descriptive statistic or an inferential statistic? Is the figure 15,562 a descriptive statistic or an inferential statistic?
A) The figure15,600 is an inferential statistic since it is indicated in the statement that it is a projection (probably based on incomplete data for the year 2004). The figure15,562 is an inferential statistic as well.
B) The figure15,600 is a descriptive statistic since it reflects the actual number of deaths from violent crimes for the year 2005. The figure15,562 is a descriptive statistic as well.
C) The figure15,600 is a descriptive statistic since it reflects the actual number of deaths from violent crimes for the year 2004. The figure15,562 is an inferential statistic since it is indicated in the statement that it is a projection (probably based on incomplete data for the year 2005).
D) The figure15,600 is an inferential statistic since it is indicated in the statement that it is a projection (probably based on incomplete data for the year 2005). The figure 15,562 is a descriptive statistic since it reflects the actual number of deaths from violent crimes for the year 2004.

Answer: D

Answer the question.

11) A magazine publisher mails a survey to every subscriber asking about the quality of its subscription service. The total number of subscribers represents what?
A) The population B) The sample

Answer: A

12) A magazine publisher mails a survey to every subscriber asking about the timeliness of its subscription service. The publisher finds that only 4% of the subscribers responded. This 4% represents what?
A) The population B) The sample

Answer: B

13) A magazine publisher always mails out a questionnaire six months before a subscription ends. This questionnaire asks its subscribers if they are going to renew their subscriptions. On average, only 3% of the subscribers respond to the questionnaire. Of the 3% who do respond, an average of 40% say that they will renew their subscription. This 3% who respond to the questionnaire are known as what?
A) The population B) The sample

Answer: B

14) An employee at the local ice cream parlor asks three customers if they like chocolate ice cream. Identify the sample and population.
A) Sample: the customers who like chocolate ice cream; population: all customers
B) Sample: the 3 selected customers; population: all customers
C) Sample: all customers; population: the 3 selected customers
D) Sample: the 3 selected customers; population: the customers who like chocolate ice cream

Answer: B

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15) 100,000 randomly selected adults were asked whether they drink at least 48 oz of water each day and only 45% said yes. Identify the sample and population.
A) Sample: all adults ; population: the 100,000 selected adults
B) Sample: the 100,000 selected adults; population: the 45% of adults who drink at least 48 oz of water
C) Sample: the 45% of adults who drink at least 48 oz of water; population: all adults
D) Sample: the 100,000 selected adults; population: all adults

Answer: D

16) In a poll of 50,000 randomly selected college students, 74% answered "yes" when asked "Do you have a television in your dorm room?" Identify the sample and population.
A) Sample: all college students; population: the 50,000 selected college students
B) Sample: the 74% who answered "yes"; population: all college students
C) Sample: the 50,000 selected college students; population: the 74% who answered "yes"
D) Sample: the 50,000 selected college students; population: all college students

Answer: D

17) A computer network manager wants to test the reliability of some new and expensive fiber-optic Ethernet cables that the computer department just received. The computer department received 7 boxes containing 40 cables each. The manager does not have the time to test every cable in each box. The manager will choose one box at random and test 8 cables chosen randomly within that box. What is the population?
A) 280 cables
B) The 7 boxes
C) The one box that was chosen at random from the 7 boxes
D) The 8 cables chosen randomly for testing

Answer: A

18) A computer network manager wants to test the reliability of some new and expensive fiber-optic Ethernet cables that computer department just received. The computer department received 4 boxes containing 50 cables each. The manager does not have the time to test every cable in each box. The manager will choose one box at random and test 10 cables chosen randomly within that box. What is the sample?
A) The 10 cables chosen for testing
B) 200 cables
C) The 4 boxes
D) The one box that was chosen at random from the 4 boxes

Answer: A

19) George, a network engineer, ordered 600 CAT 5e Ethernet cables for use at his company's network. After receiving these cables, he decided to randomly test 180 of these cables before using them. He was alarmed to find out that 88% of these cables failed completely. He returned the entire lot to the manufacturer. When he tested the cables, what was George's sample?
A) 158 cables B) 180 cables C) 528 cables D) 600 cables

Answer: B

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20) The spell–checker in a desktop publishing application may not catch all misspellings (e.g. their, there) or correctly interpret the spellings of proper names. Jackie is an expert editor and can proofread extremely quickly. Jackie is hired by a book publisher to check the spelling of every word in the latest proof of a history book. With regard to Jackie's assignment, what is the population?

A) The latest proof of the history book
B) The total number of misspellings that Jackie finds in the latest proof of the history book
C) Finding misspellings in the latest proof of the history book
D) Every word in the latest proof of the history book

Answer: D

Identify the study as an observational study or a designed experiment.

21) At one hospital in 1992, 674 women were diagnosed with breast cancer. Five years later, 88% of the Caucasian women and 83% of the African American women were still alive.

A) Designed experiment B) Observational study

Answer: B

22) An educational researcher used school records to determine that, in one school district, 84% of children living in two–parent homes graduated high school while 75% of children living in single–parent homes graduated high school.

A) Designed experiment B) Observational study

Answer: B

23) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received the experimental drug, the second group received a placebo, and the third group received no treatment. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. The average change in blood pressure was calculated for each of the three groups and the three averages were compared.

A) Designed experiment B) Observational study

Answer: A

24) A researcher wished to assess the importance of exercise in weight–loss programs. 412 people, all considered to be at least 20 pounds overweight, volunteered to participate in a study. The participants were randomly assigned to one of two groups. Over a two–month period, the first group followed a particular diet but were instructed to perform no exercise other than walking. The second group followed the same diet but also performed aerobic exercise for one hour each day. At the end of the two months, the weight loss of each participant was recorded. The average weight loss was calculated for each group and it was found that the average weight loss for the second group was significantly greater than the average weight loss for the first group.

A) Designed experiment B) Observational study

Answer: A

25) A clinic gives a drug to a group of ten patients and a placebo to another group of ten patients to find out if the drug has an effect on the patients' illness.

A) Designed experiment B) Observational study

Answer: A

26) A political pollster reports that his candidate has a 10% lead in the polls with 10% undecided.

A) Designed experiment B) Observational study

Answer: B

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27) A doctor induces a cardiac stress test to determine the reason for a patient's illness.
A) Designed experiment B) Observational study

Answer: A

28) In a group of 500 men and women, those who smoked did worse on tests of reaction time than those who did not smoke.
A) Designed experiment B) Observational study

Answer: B

29) 400 patients suffering from chronic back pain were randomly assigned to one of two groups. Over a four–month period, the first group received acupuncture treatments and the second group received a placebo. Patients who received acupuncture treatments improved more than those who received the placebo.
A) Designed experiment B) Observational study

Answer: A

30) An examination of the medical records of 10,000 women showed that those who were short and fair skinned had a higher risk of osteoperosis.
A) Designed experiment B) Observational study

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

31) Fill in the following blanks: The two major types of statistics are _____ statistics and _____ statistics.

Answer: descriptive and inferential

32) Define the terms population and sample.

Answer: A population is the complete collection of all individuals or items under consideration in a statistical study. A sample is that part of the population from which information is obtained.

33) Define observational study and designed experiment.

Answer: In an observational study, researchers simply observe and measure specific characteristics as in a sample survey. In a designed experiment researchers apply some treatment and controls and then proceed to observe its effects on the subjects and take measurements.

34) Why do statisticians sometimes use inferential statistics to draw conclusions about a population? In what situations might a statistician draw conclusions about a population using descriptive statistics only?

Answer: If a population is large, it may be too expensive and time–consuming to interview every member of the population. In such cases, a sample is drawn from the population, and based on the information in the sample, conclusions are drawn about the population; in other words, inferential statistics are used. If the population is relatively small, it may be realistic to interview every member of the population, in which case only descriptive statistics are needed.

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35) At one hospital in 1992, 674 women were diagnosed with breast cancer. Five years later, 88% of the Caucasian women and 63% of the African American women were still alive. This observational study shows an association between race and breast cancer survival--that Caucasian women are more likely to survive breast cancer than African American women. How could this study be modified to make it a designed experiment? Comment on the feasibility of the designed experiment that you described.

Answer: To make the study a designed experiment, a researcher could start with a randomly chosen group of women who had been diagnosed with breast cancer in 1992. The women would then be divided into two groups: Caucasian women and African American women. The two groups of women would be required to receive the exact same cancer treatment over the next five years; then the survival rates would be recorded. This designed experiment may be infeasible because some of the women may not wish to receive the treatment provided versus a treatment that could be more appropriate to their case (radiation, chemotherapy, surgery) or any cancer treatment whatsoever. Controlling the treatment method may not be sufficient to establish whether there is a causation between race and survival rate. Other factors may affect the survival statistics, such as economic status, age, other health factors, etc.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

List all possible samples from the specified population.

36) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B), Danny (D), Eric (E), and Joan (J). Consider these finalists to be a population of interest. List the 15 possible samples (without replacement) of size two from this population of six finalists.

A) D,D D,E D,J E,L E,M E,B E,D E,E E,J J,L J,M J,B J,D J,E J,J

B) L,M L,B L,D L,E L,J M,B M,D
M,E M,J B,D B,E B,J D,E D,J E,J

C) L,L L,M L,B L,D L,E L,J M,M M,B
M,D M,E M,J B,B B,D B,E B,J

D) L,L L,M L,B L,D L,E L,J M,L M,M
M,B M,D M,E M,J B,L B,M B,B

Answer: B

37) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B), Danny (D), Eric (E), and Joan (J). Consider these finalists to be a population of interest. List the 20 possible samples (without replacement) of size three from this population of six finalists.

A) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J L,E,J
M,B,D M,B,E M,B,J M,D,E M,D,J M,E,J M,L,B M,L,D M,L,J B,D,E

B) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J L,L,M
M,B,D M,B,E M,B,J M,D,E M,D,J M,M,J B,D,E B,B,J B,E,J D,D,J

C) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J L,E,J
L,L,M L,L,B L,L,D L,L,E L,L,J M,M,B M,M,D M,M,E M,M,J B,B,D

D) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J L,E,J
M,B,D M,B,E M,B,J M,D,E M,D,J M,E,J B,D,E B,D,J B,E,J D,E,J

Answer: D

38) The members of a board of directors have the following roles: president (P), vice president (V), secretary (S), treasury (T), and fundraiser (F). Consider these board members to be a population of interest. List the 10 possible samples (without replacement) of size two from this population of five board members.

A) P,V P,S P,T P,F V,S V,T V,F S,T S,F T,F

B) P,V P,S P,T P,F V,P V,S V,T V,F S,P S,V

C) P,P P,V P,S P,T P,F V,V V,S V,T V,F S,S

D) S,T S,F T,P T,V T,S T,F F,P F,V F,S F,T

Answer: A

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39) The six members of a board of directors are Sam (S), Laurie (L), Peggy (P), Jorges (J), Max (M), and Claude (C). Consider these board members to be a population of interest. List the 15 possible samples (without replacement) of size four from this population of six board members.

A) S,L,P,J S,L,P,M S,L,P,C S,L,J,M S,L,J,C S,L,M,C S,J,M,C L,P,J,M
L,S,P,J P,P,J,M L,P,J,C L,P,M,C L,J,M,C P,S,M,C P,J,M,C

B) S,S,L,P S,L,P,J S,L,P,M S,L,P,C S,L,J,M S,P,J,M S,P,J,C S,P,M,C
S,J,M,C L,L,P,J L,P,J,M L,P,J,C L,P,M,C L,J,M,C P,J,M,C

C) S,L,P,J S,L,P,M S,L,P,C S,L,J,M S,L,J,C S,L,M,C S,P,J,M S,P,J,C
S,P,M,C S,J,M,C L,P,J,M L,P,J,C L,P,M,C L,J,M,C P,J,M,C

D) S,L,P,J S,L,P,M S,L,P,C S,P,J,M S,P,J,C S,P,M,C S,J,M,C L,S,P,J
L,P,J,M L,P,J,C L,P,M,C L,J,M,C P,S,J,M P,J,M,C J,S,M,C

Answer: C

40) Given a group of students: Allen (A), Brenda (B), Chad (C), Dorothy (D), and Eric (E), list all of the possible samples (without replacement) of size four that can be obtained from the group.

A) A,B,C,D A,B,C,E A,C,D,E A,D,E,B B,C,D,E B,C,E,A B,D,E,A
C,A,B,D C,E,D,B D,A,C,E

B) A,B,C,D A,B,C,E A,C,D,E A,D,E,B B,C,D,E

C) A,B,C,D A,B,C,E A,C,D,E A,D,E,B

D) A,B,C,D

Answer: B

Provide an appropriate response.

41) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B), Danny (D), Eric (E), and Joan (J). Consider these finalists to be a population of interest. The possible samples (without replacement) of size two that can be obtained from this population of six finalists are as follows.

L,M L,B L,D L,E L,J M,B M,D
M,E M,J B,D B,E B,J D,E D,J E,J

If a simple random sampling method is used to obtain a sample of two of the finalists, what are the chances of selecting Lisa and Danny?

A) $\frac{2}{15}$ B) $\frac{1}{15}$ C) $\frac{1}{3}$ D) $\frac{1}{6}$

Answer: B

42) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B), Danny (D), Eric (E), and Joan (J). Consider these finalists to be a population of interest. The possible samples (without replacement) of size three that can be obtained from this population of six finalists are as follows.

L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E
L,B,J L,D,E L,D,J L,E,J M,B,D M,B,E
M,B,J M,D,E M,D,J M,E,J B,D,E B,D,J
B,E,J D,E,J

If a simple random sampling method is used to obtain a sample of three of the finalists, what are the chances of selecting Ben, Danny, and Joan?

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{20}$ D) $\frac{3}{20}$

Answer: C

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43) The members of a board of directors have the following roles: president (P), vice president (V), secretary (S), treasury (T), and fundraiser (F). Consider these board members to be a population of interest. The possible samples (without replacement) of size two that can be obtained from these five board members are as follows.

P,V P,S P,T P,F V,S V,T V,F S,T S,F T,F

If a simple random sampling method is used to obtain a sample of two of the board members, what are the chances of selecting the secretary and the treasurer?

A) $\frac{1}{20}$ B) $\frac{1}{10}$ C) $\frac{2}{5}$ D) $\frac{1}{5}$

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use the random number table in Appendix A to obtain the required list of random numbers.

44) A market researcher is conducting a telephone poll. She has a list of 581 registered voters and wishes to interview a random sample of 12 of them. Construct a list of 12 random numbers between 1 and 581 that can be used in obtaining the required simple random sample. Use the random number table and use as your starting point the digits 432 in row 13, columns 10–12.

Answer: 432, 452, 534, 16, 343, 242, 428, 378, 163, 182, 293, 422

45) A medical researcher is conducting clinical trials. Of the 60 people participating in the trial, 20 will receive a placebo, 20 will receive the experimental drug, and 20 will constitute the control group. The 20 people who will receive the drug will be selected at random. Construct a list of 20 random numbers between 1 and 60 which can be used in obtaining the required simple random sample. Use the random number table and use as your starting point the digits 54 in row 15, columns 20–21.

Answer: 54, 2, 3, 41, 24, 19, 8, 30, 4, 6, 36, 15, 14, 40, 1, 5, 39, 42, 58, 10

46) A company employs 5382 people and wishes to interview a random sample of 14 of them with regard to the company's health insurance policy. Construct a list of 14 random numbers between 1 and 5382 that can be used in obtaining the required simple random sample. Use the random number table and use as your starting point the digits 0691 in row 3, columns 30–33.

Answer: 691, 3863, 3034, 978, 4584, 99, 362, 245, 1788, 4947, 471, 1562, 684, 2598

47) A magazine is awarding a cash prize for 10 winners in its competition. 470 of the contestants have answered all the competition questions correctly. The magazine will pick the 10 winners at random from among these 470 contestants. Construct a list of 10 random numbers between 1 and 470 that can be used in obtaining the required simple random sample. Use the random number table and use as your starting point the digits 270 in row 12, columns 5–7.

Answer: 270, 455, 415, 151, 310, 85, 105, 378, 84, 129

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Provide an appropriate response.

48) True or false? In simple random sampling, each possible sample is equally likely to be the one obtained.

A) True B) False

Answer: A

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SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

49) Define simple random sampling. Explain why this is important in design of experiments.

Answer: In simple random sampling, each member of the population has an equal chance of being selected. Random sampling provides us with the best representative sample in which all groups of the population are approximately proportionately represented. Careless sampling can easily result in a biased sample which may be useless.

50) Define probability sampling. Identify some advantages of probability sampling.

Answer: Probability sampling consists of using a randomizing device such as tossing a coin or consulting a random number table to decide which members of the population will constitute the sample. Probability sampling eliminates unintentional selection bias, permits the researcher to control the chance of obtaining a non–representative sample, and guarantees that the techniques of inferential statistics can be applied.

51) A political researcher wishes to gauge political sentiment regarding a proposed tax cut. He obtains a list of 1000 email addresses from an internet provider, uses a random number table to select a random sample of 100 of these addresses, emails the people in the sample and requests that they respond to his questions by email. Do you think that the group of people who respond is likely to be representative of all registered voters? Explain your answer.

Answer: No; explanations will vary. Possible answer: the sample was obtained from among people who own a computer. That group is likely to include relatively wealthy people who are more likely to favor a tax cut. Furthermore, the group includes those who chose voluntarily to respond. People who respond voluntarily are likely to have stronger opinions than the average voter.

52) A store manager wishes to determine whether his customers would be prepared to pay a little extra for organic produce. He uses a random number table to choose 50 random numbers between 1 and 200. He stands outside the store on a Monday morning between 9:00 a.m. and 12:00 noon and interviews the people corresponding to the random numbers. For example random number 82 would correspond to the 82nd person to arrive. Do you think that the sample obtained in this way will be representative of all the store's customers?

Answer: No; explanations will vary. Possible answer: the sample was obtained from among people shopping on a Monday morning. That group is likely to include a relatively large number of people who do no have full time jobs and a relatively large number of parents. This group may tend to have different views than the entire population of customers. People with young children, for example, may be more concerned than most about the health effects of produce grown with pesticides.

53) A college lecturer has devised a new method of teaching a particular mathematical concept and wishes to try out this teaching method on a representative sample of his students. There are 76 students in his class and he wishes to obtain a simple random sample of 25 of them. Describe a method he could use to obtain the sample.

Answer: Answers will vary. Possible answer: List the students' names alphabetically and assign them numbers 1 to 76 according to this list. Use a random number table to construct a list of 25 random numbers between 1 and 76 and select the students corresponding to those numbers.

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54) A college lecturer has devised a new method of teaching a particular mathematical concept and wishes to try out this teaching method on a representative sample of his students. There are 76 students in his class and he wishes to obtain a simple random sample of 25 of them. Describe a method which would be unlikely to yield a representative sample.

Answer: Answers will vary. Possible answer: The lecturer stands at the door of his classroom and tells the first 25 students to arrive to class that they are invited to a special bonus session of class to be held at some upcoming date. This is unlikely to yield a representative sample as the students who show up to class first could possibly be the ones who are more conscientious and hard-working. Or, the students may refuse to volunteer for an extra class period, so the lecturer's sample would be too small to be a representative sample.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

55) From a group of 496 students, every 49th student starting with the 3rd student is selected. Identify the type of sampling used in this example.

A) Systematic random sampling
B) Stratified sampling
C) Cluster sampling
D) Simple random sampling

Answer: A

56) An education researcher randomly selects 38 schools from one school district and interviews all the teachers at each of the 38 schools. Identify the type of sampling used in this example.

A) Simple random sampling
B) Systematic random sampling
C) Stratified sampling
D) Cluster sampling

Answer: D

57) At a college there are 120 freshmen, 90 sophomores, 110 juniors, and 80 seniors. A school administrator selects a simple random sample of 12 of the freshmen, a simple random sample of 9 of the sophomores, a simple random sample of 11 of the juniors, and a simple random sample of 8 of the seniors. She then interviews all the students selected. Identify the type of sampling used in this example.

A) Simple random sampling
B) Stratified sampling
C) Cluster sampling
D) Systematic random sampling

Answer: B

58) A pollster uses a computer to generate 500 random numbers and then interviews the voters corresponding to those numbers. Identify the type of sampling used in this example.

A) Stratified sampling
B) Systematic random sampling
C) Simple random sampling
D) Cluster sampling

Answer: C

59) Before premiering a blockbuster movie at a theater, test screenings are done beforehand. A small number of selected theaters are chosen geographically throughout the country. Each theater chosen is supposed to be representative of theatergoers in that area. Everyone is interviewed when the movie is over. Identify the type of sampling used in this example.

A) Systematic sampling
B) Attempted census
C) Cluster sampling
D) Stratified sampling

Answer: C

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60) A newly–premiered play just ended that evening at a local theater. Theater management briefly interviews every tenth person leaving the theater to see if that person will recommend the play at that theater to other people. Identify the type of sampling used in this example.

A) Cluster sampling
B) Systematic sampling
C) Multistage sampling
D) Stratified sampling

Answer: B

61) A mega–discount chain store just opened a new clothing store in town emphasizing mainly women's clothing. Before opening, management had to decide whether to only carry either men's, women's, boys', girls', or infants' clothing. After performing representative sampling of potential customers from each of these groups, it was decided to carry only women's clothing. Identify the type of sampling used in this example.

A) Cluster sampling
B) Systematic sampling
C) Multistage sampling
D) Stratified sampling

Answer: D

62) The human resources department of a large, well–known telecommunications firm is behind schedule in sampling the job satisfaction of the company's employees. In an effort to catch–up, the HR manager quickly goes down an alphabetical list of employees and e–mails a survey to every tenth employee. An neutral third party collects all surveys and ensures all of the selected employees respond to the survey. What sampling method best describes what the HR manager is doing?

A) Stratified sampling
B) Multistage sampling
C) Systematic sampling
D) Cluster sampling

Answer: C

63) Geologists have an interest in the structure and the history of the earth. A geologist can go back in time by drilling deep into the ground, retrieving a core sample, estimating the ages of the various layers, and examining the composition. A timeline can be built of the entire area from where the core sample was drilled. A geologist may retrieve several core samples to confirm the history of the earth's structure in that sampled area. Mountains, lakes, and unstable ground can easily impede a simple random sampling of a desired geographical area, therefore what is the most realistic sampling method that represents the actual drillings, comparisons, and scientific examinations of several core samples within the same geographical area?

A) Multistage sampling
B) Cluster sampling
C) Systematic sampling
D) Stratified sampling

Answer: B

64) Several watch–dog consumer groups have criticized the fast food industry for serving food with excessive fat content. One watch–dog announced that it will randomly select one fast food chain per week. The watch–dog will then decide, as a group, to purchase one item off the menu that has been advertised the most on television and in the newspapers. The watch–dog will then have that heavily–advertised, just–purchased item professionally sampled for fat content. Weekly results will be posted on the watch–dog's website. For this scenario, what best describes the watch–dog's sampling activities each week?

A) Stratified sampling
B) Cluster sampling
C) Systematic sampling
D) Multistage sampling

Answer: D

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SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

65) Define the terms "stratified sampling", "systematic sampling" and "cluster sampling". Give examples for each.

Answer: Stratified sampling subdivides the population into at least two different subpopulations (strata) and then draws a simple random sample from each stratum.

Systematic sampling divides the population size by the sample size and rounds the result down to the nearest whole number, m. Then, using a random–number table to obtain a number k between 1 and m, selects for the sample those members numbered k, k + m, k + 2m, and so on.

In cluster sampling, the population is divided into sections, then sections are randomly selected, and then all members of the randomly selected sections are surveyed. Examples will vary.

66) Which method of sampling is easier: simple random sampling or systematic random sampling?

Answer: Systematic random sampling

67) Describe the steps involved when using stratified random sampling with proportional allocation. What are the advantages of this sampling method?

Answer: Answers will vary. Possible answer: The population is first divided into subpopulations (strata). From each stratum, a simple random sample is obtained whose size is proportional to the size of the stratum. The advantage of this method is that it ensures that no stratum is missed.

68) Describe the advantages and disadvantages of cluster sampling as compared with simple random sampling.

Answer: Answers will vary. Possible answer: Cluster sampling can save time when members of the population are widely scattered geographically. The disadvantage is that members of a cluster may be more homogeneous than the members of the population as a whole and may not mirror the entire population.

69) A researcher wishes to assess the working conditions of farm workers at farms in his district. There are 37 farms in the district which are widely scattered geographically. The researcher wishes to interview at least 300 farm workers. Describe a method for selecting a sample which involves cluster sampling. Each farm employs approximately 50 workers.

Answer: Answers will vary. Possible answer: Obtain a simple random sample of the farms as follows: Number the farms 1 to 37. Use a random number table to obtain a list of six random numbers between 1 and 37. Select the farms corresponding to those six numbers and interview all workers at each of the six farms.

70) A tax auditor has a pile of 191 tax returns of which he would like to select 17 for a special audit. Describe a method for selecting the sample which involves systematic random sampling.

Answer: Answers will vary. Possible answer: The tax auditor could number the returns 1 through 191. He could then use a random number table to select a number at random between 1 and 11. Starting with that number, he could list every 11th number until he has 17 numbers. He could then select the tax returns corresponding to the numbers listed.

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71) The residents of one town are classified by a social scientist as follows.

Lower income: 4005
Middle income: 2047
Upper income: 2848

The scientist wishes to pick a sample of 200 of the residents for a study. Describe a method for selecting the sample which involves stratified sampling with proportional allocation.

Answer: Answers will vary. Possible answer: Proportional allocation dictates that the number of lower income, middle income, and upper income residents selected by the scientist be 90, 46, and 64, respectively. Thus the scientist can obtain a stratified sample of 200 residents as follows: Number the lower income residents from 1 through 4005 and use table of random numbers to randomly select 90 of the 4005 lower income residents; number the middle income residents from 1 to 2047 and use a table of random numbers to randomly select 46 of the 2047 middle income residents; number the upper income residents from 1 to 2848 and use a table of random numbers to randomly select 64 of the 2848 upper income residents.

72) The effects of global warming on the planet have received increased national attention in recent years. But how many U.S. adults would be willing to change certain personal behaviors in order to help reverse the effects of global warming? A major pollster conducted a telephone poll of 1010 U.S. adults to determine the answer to the following questions: (1) Is public transportation a viable option for you? (2) If not, do you own a hybrid vehicle or one that gets more than an overall average of 30 miles per gallon? (3) If not, would you be willing to purchase a hybrid vehicle within the five years? Respondents were also asked questions about age, sex, race, education, region, and household income to ensure that results represented a cross section of U.S. adults.
i) What kind of sampling design was used in this survey? Explain your answer.
ii) If 89% of the respondents answered the first question in the negative, what was the approximate sample size for the second question?
iii) If 75% of those responding to the second question answered "no," what was the approximate size for the third question?

Answer: i) This is a poll taken by calling randomly selected U.S. adults. Thus, the sampling design appears to be simple random sampling, although it is possible that a more complex, multi–stage design was used to ensure that various political, educational, or other types of groups were proportionately represented in the sample.
ii) The approximate sample size for the second question was 89% of 1010, or 899.
iii) The approximate sample size for the second question was 75% of 899, or 674.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

A designed experiment is described. Identify the specified element of the experiment.

73) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the experimental units (subjects).

A) The participants in the experiment
B) The diastolic blood pressures of the participants
C) The three different groups
D) The treatment (i.e., placebo, low dosage of drug, or high dosage of drug)

Answer: A

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74) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the response variable.

A) The dosage of the drug
B) The participants in the experiment
C) Change in diastolic blood pressure
D) The treatment received (placebo, low dosage, high dosage)

Answer: C

75) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the factor.

A) The participants in the experiment
B) Diastolic blood pressure
C) The change in blood pressure
D) The dosage of the drug

Answer: D

76) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the levels of the factor.

A) Diastolic blood pressure at the start, diastolic blood pressure at the end
B) High blood pressure, low blood pressure
C) Placebo, low dosage, high dosage
D) The experimental drug

Answer: C

77) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the experimental drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the treatments.

A) Low dosage of drug, high dosage of drug
B) Diastolic blood pressure at start, diastolic blood pressure at end
C) Placebo, low dosage of drug, high dosage of drug
D) The experimental drug

Answer: C

78) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (method A, method B, and method C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Identify the response variable.

A) Method A, method B, method C
B) Teacher
C) Teaching method
D) Score on reading test

Answer: D

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79) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (method A, method B, and method C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Identify the factors.

A) Juliana, Felix, Sonia, and Helen
B) Teaching method and teacher
C) Method A, method B, method C
D) Score on reading test

Answer: B

80) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (method A, method B, and method C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Identify the levels of the factor "teaching method".

A) Score on reading test
B) Teaching method and teacher
C) Juliana, Felix, Sonia, and Helen
D) Method A, method B, method C

Answer: D

81) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (method A, method B, and method C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Identify the experimental units (subjects).

A) The 258 students participating in the study
B) The three groups of students (those assigned to method A, those assigned to method B, and those assigned to method C)
C) Teaching method and teacher
D) Method A, method B, method C

Answer: A

82) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are two different teachers (Juliana and Felix) and three different teaching methods (method A, method B, and method C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Identify the treatments.

A) Method A, method B, method C
B) Juliana, Felix, Sonia, and Helen
C) Juliana and method A, Juliana and method B, Juliana and method C, Felix and method A, Felix and method B, Felix and method C
D) Teaching method and teacher

Answer: C

83) A herpetologist performed a study on the effects of the body type and mating call of the male bullfrog as signals of quality to mates. Four life–sized dummies of male bullfrogs and two sound recordings provided a tool for testing female response to the unfamiliar frogs whose bodies varied by size (large or small) and color (dark or light) and whose mating calls varied by pitch (high, normal, or low). The female bullfrogs were observed to see whether they approached each of the four life–sized dummies. Identify the experimental units.

A) The male bullfrogs
B) The female bullfrogs
C) The scientist
D) All of the frogs, male and female

Answer: B

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84) A herpetologist performed a study on the effects of the body type and mating call of the male bullfrog as signals of quality to mates. Four life–sized dummies of male bullfrogs and two sound recordings provided a tool for testing female response to the unfamiliar frogs whose bodies varied by size (large or small) and color (dark or light) and whose mating calls varied by pitch (high, normal, or low). The female bullfrogs were observed to see whether they approached each of the four life–sized dummies. Identify the response variable.
A) Large and small; dark and light; call and no call
B) Whether or not (yes or no) the female frogs approached a male dummy
C) The four life–sized dummy male bullfrogs
D) Whether or not the male frogs were large and light–colored

Answer: B

85) A herpetologist performed a study on the effects of the body type and mating call of the male bullfrog as signals of quality to mates. Four life–sized dummies of male bullfrogs and two sound recordings provided a tool for testing female response to the unfamiliar frogs whose bodies varied by size (large or small) and color (dark or light) and whose mating calls varied by pitch (high, normal, or low). The female bullfrogs were observed to see whether they approached each of the four life–sized dummies. Identify the factor(s).
A) Large or small, dark or light, high pitch, normal pitch, or low pitch
B) Body size, body color, and mating call pitch
C) Whether or not (yes or no) the female frogs approached a male dummy
D) Body type and mating call

Answer: B

86) A herpetologist performed a study on the effects of the body type and mating call of the male bullfrog as signals of quality to mates. Four life–sized dummies of male bullfrogs and two sound recordings provided a tool for testing female response to the unfamiliar frogs whose bodies varied by size (large or small) and color (dark or light) and whose mating calls varied by pitch (high, normal, or low). The female bullfrogs were observed to see whether they approached each of the four life–sized dummies. Identify the levels of each factor.
A) Body size has two levels: large and small. Body color has two levels: dark and light. Mating call pitch has three levels: high, normal, and low.
B) Body size has three levels: large, medium, and small. Body color has three levels: dark, medium, and light. Mating call pitch has three levels: high, normal, and low.
C) Body size has three levels: large, medium, and small. Body color has three levels: dark, medium, and light. Mating call pitch has two levels: high and low.
D) There are three levels: body size, body color, and mating call pitch

Answer: A

87) A herpetologist performed a study on the effects of the body type and mating call of the male bullfrog as signals of quality to mates. Four life–sized dummies of male bullfrogs and two sound recordings provided a tool for testing female response to the unfamiliar frogs whose bodies varied by size (large or small) and color (dark or light) and whose mating calls varied by pitch (high, normal, or low). The female bullfrogs were observed to see whether they approached each of the four life–sized dummies. Identify the treatments.
A) The eighteen different possible combinations of the two body sizes, three body colors, and three mating call pitches
B) The twelve different possible combinations of the three body sizes, two body colors, and two mating call pitches
C) The eight different possible combinations of the two body sizes, two body colors, and two mating call pitches
D) The twelve different possible combinations of the two body sizes, two body colors, and three mating call pitches

Answer: D

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SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

88) Explain the difference between an observational study and a designed experiment.

Answer: Answers will vary. Possible answer: In an observational study, there is no manipulation of the variables and the researchers simply observe characteristics and take measurements. In a designed experiment, the researchers manipulate variables by imposing treatments and controls before observing characteristics and taking measurements.

89) An education researcher wishes to assess the effectiveness of three different methods for teaching young children to read. The 380 children participating in the study are divided into three groups. The study runs for six months. The children in the first group are taught using method A, the children in the second group are taught using method B, and the children in the third group are taught using method C. At the end of the six months, the reading ability of the children in the different groups is assessed. Why might randomization be used when dividing the children into three groups?

Answer: Answers will vary. Possible answer: randomization is used in order to minimize the effects of possible confounding factors such as aptitude for reading of the children in the different groups. Randomizing helps to ensure that in each group there is a mixture of reading aptitudes. Differences in reading ability between the three groups at the end of the study can then more readily be attributed to the teaching method.

90) Give an example of a designed experiment. In your experiment, identify the experimental units, the response variable, the factor(s), the levels of each factor, and the treatments.

Answer: Answers will vary.

91) In a designed experiment, explain the difference between the treatments and the factors.

Answer: Answers will vary. Possible answer: the factors are the variables whose effect on the response variable is of interest. The treatments are the various experimental conditions. In a single–factor experiment, the treatments are the levels of the factor. In a multi–factor experiment, each treatment is a combination of levels of the factors.

92) An agricultural researcher wishes to compare the yield of four different varieties of wheat. 64 plots of land are available for an experiment. On each plot of land one of the varieties of wheat will be grown. At the end of the experiment the yield for the different varieties will be compared. 32 of the plots are at one site (site A) and the other 32 are at another site (site B). The soil at site A differs significantly from the soil at site B. If the researcher wishes to design an experiment using completely randomized design, how could the wheat varieties be assigned to the different plots?

Answer: Answers will vary. Possible answer: Randomly divide the 64 plots into four groups of 16 plots each. Randomly assign each group of plots to a different variety of wheat.

93) An agricultural researcher wishes to compare the yield of four different varieties of wheat. 64 plots of land are available for an experiment. On each plot of land one of the varieties of wheat will be grown. At the end of the experiment the yield for the different varieties will be compared. 32 of the plots are at one site (site A) and the other 32 are at another site (site B). The soil at site A differs significantly from the soil at site B. If the researcher wishes to design an experiment using randomized block design, how could the wheat varieties be assigned to the different plots?

Answer: Answers will vary. Possible answer: Randomly divide the 32 plots at site A into four groups of 8 plots each. Randomly assign each group of plots to a different variety of wheat. Randomly divide the 32 plots at site B into four groups of 8 plots each. Randomly assign each group of plots to a different variety of wheat.

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94) An agricultural researcher wishes to compare the yield of four different varieties of wheat. 64 plots of land are available for an experiment. On each plot of land one of the varieties of wheat will be grown. At the end of the experiment the yield for the different varieties will be compared. 32 of the plots are at one site (site A) and the other 32 are at another site (site B). The soil at site A differs significantly from the soil at site B. The researcher wishes to design an experiment. In this example, why might a randomized block design, with blocking by soil type, be preferable to a completely randomized design?

Answer: Answers will vary. Possible answer: by blocking, the researcher can isolate and remove the variation in yield which is due to different soil types. It will then be easier to detect the differences in yield among the four varieties of wheat, if such differences exist.

95) In a clinical trial, each participant will receive a placebo, a low dosage of a drug, or a high dosage of the drug. The participants consist of 90 men and 90 women. The 90 men are randomly divided into three groups of 30 men each. Each group of men is randomly assigned to a different treatment (placebo, low dose, or high dose). Likewise, the 90 women are randomly divided into three groups of 30 women each. Each group of women is randomly assigned to a different treatment (placebo, low dose, or high dose). Is this a completely randomized design or a randomized block design? Explain your answer.

Answer: This is a randomized block design. Explanations will vary.

96) Define observational study and experiment. Define the terms "treatment group" and "control group" as part of your answer.

Answer: In an observational study, we observe and measure specific characteristics, but we don't attempt to manipulate or modify the subjects being studied. In an experiment we apply some treatment and then proceed to observe its effects on the subjects. In the experiment, the group receiving the treatment is called the treatment group. The control group is the group that is not given the treatment.

97) A study was conducted to evaluate the effectiveness of a new diet pill for men. A group of 3000 men were involved in the study. Of these 3000 men, 2311 took the diet pill and 889 were given a placebo. Identify the treatments, the treatment group, and the control group.

Answer: Treatments: diet pill and placebo
Treatment group: the 2311 men who took the diet pill
Control group: the 889 men who took the placebo

98) Describe a double–blind experiment and explain why blinding is used. Define the term "placebo effect" as part of the answer.

Answer: A double–blind experiment is one in which neither the subjects nor the researchers know who is getting the treatment. Blinding is when the subject does not know whether he or she is receiving a treatment or a placebo. Blinding is used to counteract the placebo effect in which an untreated subject believes he or she is receiving a treatment and reports an improvement in symptoms due to this belief.

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1) A
2) B
3) A
4) B
5) A
6) B
7) A
8) B
9) B
10) D
11) A
12) B
13) B
14) B
15) D
16) D
17) A
18) A
19) B
20) D
21) B
22) B
23) A
24) A
25) A
26) B
27) A
28) B
29) A
30) B
31) descriptive and inferential
32) A population is the complete collection of all individuals or items under consideration in a statistical study. A sample is that part of the population from which information is obtained.
33) In an observational study, researchers simply observe and measure specific characteristics as in a sample survey. In a designed experiment researchers apply some treatment and controls and then proceed to observe its effects on the subjects and take measurements.
34) If a population is large, it may be too expensive and time–consuming to interview every member of the population. In such cases, a sample is drawn from the population, and based on the information in the sample, conclusions are drawn about the population; in other words, inferential statistics are used. If the population is relatively small, it may be realistic to interview every member of the population, in which case only descriptive statistics are needed.
35) To make the study a designed experiment, a researcher could start with a randomly chosen group of women who had been diagnosed with breast cancer in 1992. The women would then be divided into two groups: Caucasian women and African American women. The two groups of women would be required to receive the exact same cancer treatment over the next five years; then the survival rates would be recorded. This designed experiment may be infeasible because some of the women may not wish to receive the treatment provided versus a treatment that could be more appropriate to their case (radiation, chemotherapy, surgery) or any cancer treatment whatsoever. Controlling the treatment method may not be sufficient to establish whether there is a causation between race and survival rate. Other factors may affect the survival statistics, such as economic status, age, other health factors, etc.
36) B
37) D

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38) A
39) C
40) B
41) B
42) C
43) B
44) 432, 452, 534, 16, 343, 242, 428, 378, 163, 182, 293, 422
45) 54, 2, 3, 41, 24, 19, 8, 30, 4, 6, 36, 15, 14, 40, 1, 5, 39, 42, 58, 10
46) 691, 3863, 3034, 978, 4584, 99, 362, 245, 1788, 4947, 471, 1562, 684, 2598
47) 270, 455, 415, 151, 310, 85, 105, 378, 84, 129
48) A
49) In simple random sampling, each member of the population has an equal chance of being selected. Random sampling provides us with the best representative sample in which all groups of the population are approximately proportionately represented. Careless sampling can easily result in a biased sample which may be useless.
50) Probability sampling consists of using a randomizing device such as tossing a coin or consulting a random number table to decide which members of the population will constitute the sample. Probability sampling eliminates unintentional selection bias, permits the researcher to control the chance of obtaining a non–representative sample, and guarantees that the techniques of inferential statistics can be applied.
51) No; explanations will vary. Possible answer: the sample was obtained from among people who own a computer. That group is likely to include relatively wealthy people who are more likely to favor a tax cut. Furthermore, the group includes those who chose voluntarily to respond. People who respond voluntarily are likely to have stronger opinions than the average voter.
52) No; explanations will vary. Possible answer: the sample was obtained from among people shopping on a Monday morning. That group is likely to include a relatively large number of people who do no have full time jobs and a relatively large number of parents. This group may tend to have different views than the entire population of customers. People with young children, for example, may be more concerned than most about the health effects of produce grown with pesticides.
53) Answers will vary. Possible answer: List the students' names alphabetically and assign them numbers 1 to 76 according to this list. Use a random number table to construct a list of 25 random numbers between 1 and 76 and select the students corresponding to those numbers.
54) Answers will vary. Possible answer: The lecturer stands at the door of his classroom and tells the first 25 students to arrive to class that they are invited to a special bonus session of class to be held at some upcoming date. This is unlikely to yield a representative sample as the students who show up to class first could possibly be the ones who are more conscientious and hard–working. Or, the students may refuse to volunteer for an extra class period, so the lecturer's sample would be too small to be a representative sample.
55) A
56) D
57) B
58) C
59) C
60) B
61) D
62) C
63) B
64) D

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65) Stratified sampling subdivides the population into at least two different subpopulations (strata) and then draws a simple random sample from each stratum.

Systematic sampling divides the population size by the sample size and rounds the result down to the nearest whole number, m. Then, using a random–number table to obtain a number k between 1 and m, selects for the sample those members numbered k, k + m, k + 2m, and so on.

In cluster sampling, the population is divided into sections, then sections are randomly selected, and then all members of the randomly selected sections are surveyed. Examples will vary.

66) Systematic random sampling

67) Answers will vary. Possible answer: The population is first divided into subpopulations (strata). From each stratum, a simple random sample is obtained whose size is proportional to the size of the stratum. The advantage of this method is that it ensures that no stratum is missed.

68) Answers will vary. Possible answer: Cluster sampling can save time when members of the population are widely scattered geographically. The disadvantage is that members of a cluster may be more homogeneous than the members of the population as a whole and may not mirror the entire population.

69) Answers will vary. Possible answer: Obtain a simple random sample of the farms as follows: Number the farms 1 to 37. Use a random number table to obtain a list of six random numbers between 1 and 37. Select the farms corresponding to those six numbers and interview all workers at each of the six farms.

70) Answers will vary. Possible answer: The tax auditor could number the returns 1 through 191. He could then use a random number table to select a number at random between 1 and 11. Starting with that number, he could list every 11th number until he has 17 numbers. He could then select the tax returns corresponding to the numbers listed.

71) Answers will vary. Possible answer: Proportional allocation dictates that the number of lower income, middle income, and upper income residents selected by the scientist be 90, 46, and 64, respectively. Thus the scientist can obtain a stratified sample of 200 residents as follows: Number the lower income residents from 1 through 4005 and use table of random numbers to randomly select 90 of the 4005 lower income residents; number the middle income residents from 1 to 2047 and use a table of random numbers to randomly select 46 of the 2047 middle income residents; number the upper income residents from 1 to 2848 and use a table of random numbers to randomly select 64 of the 2848 upper income residents.

72) i) This is a poll taken by calling randomly selected U.S. adults. Thus, the sampling design appears to be simple random sampling, although it is possible that a more complex, multi–stage design was used to ensure that various political, educational, or other types of groups were proportionately represented in the sample.
ii) The approximate sample size for the second question was 89% of 1010, or 899.
iii) The approximate sample size for the second question was 75% of 899, or 674.

73) A
74) C
75) D
76) C
77) C
78) D
79) B
80) D
81) A
82) C
83) B
84) B
85) B
86) A
87) D

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88) Answers will vary. Possible answer: In an observational study, there is no manipulation of the variables and the researchers simply observe characteristics and take measurements. In a designed experiment, the researchers manipulate variables by imposing treatments and controls before observing characteristics and taking measurements.
89) Answers will vary. Possible answer: randomization is used in order to minimize the effects of possible confounding factors such as aptitude for reading of the children in the different groups. Randomizing helps to ensure that in each group there is a mixture of reading aptitudes. Differences in reading ability between the three groups at the end of the study can then more readily be attributed to the teaching method.
90) Answers will vary.
91) Answers will vary. Possible answer: the factors are the variables whose effect on the response variable is of interest. The treatments are the various experimental conditions. In a single–factor experiment, the treatments are the levels of the factor. In a multi–factor experiment, each treatment is a combination of levels of the factors.
92) Answers will vary. Possible answer: Randomly divide the 64 plots into four groups of 16 plots each. Randomly assign each group of plots to a different variety of wheat.
93) Answers will vary. Possible answer: Randomly divide the 32 plots at site A into four groups of 8 plots each. Randomly assign each group of plots to a different variety of wheat. Randomly divide the 32 plots at site B into four groups of 8 plots each. Randomly assign each group of plots to a different variety of wheat.
94) Answers will vary. Possible answer: by blocking, the researcher can isolate and remove the variation in yield which is due to different soil types. It will then be easier to detect the differences in yield among the four varieties of wheat, if such differences exist.
95) This is a randomized block design. Explanations will vary.
96) In an observational study, we observe and measure specific characteristics, but we don't attempt to manipulate or modify the subjects being studied. In an experiment we apply some treatment and then proceed to observe its effects on the subjects. In the experiment, the group receiving the treatment is called the treatment group. The control group is the group that is not given the treatment.
97) Treatments: diet pill and placebo
Treatment group: the 2311 men who took the diet pill
Control group: the 889 men who took the placebo
98) A double–blind experiment is one in which neither the subjects nor the researchers know who is getting the treatment. Blinding is when the subject does not know whether he or she is receiving a treatment or a placebo. Blinding is used to counteract the placebo effect in which an untreated subject believes he or she is receiving a treatment and reports an improvement in symptoms due to this belief.

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