Chapter 4

MC

2015

5. At a large conference of teachers from a variety of subjects, a random sample of 50 mathematics teachers attending the conference was selected. Among the selected mathematics teachers, 28 percent had taken one or more courses in statistics. For which of the following populations is 28 percent a reasonable estimate of the percentage of those who have taken one or more courses in statistics?

(A) All mathematics teachers

(B) All mathematics teachers who attended the conference

(C) All mathematics teachers who have taken one or more courses in statistics

(D) All teachers who attended the conference

(E) All teachers

39. In a certain school, students can choose whether to eat in the school's cafeteria. A reporter working for the school's newspaper polled students on their reactions to changes in the menu at the cafeteria. For each student leaving the cafeteria in one 30-minute time period, the reporter used a coin to determine whether to stop the student and ask how he or she felt about the new menu. In the reporter's article it was stated that a random sample of the students showed that 89 percent of the school's student population was happy with the new menu. Which of the following statements is true?

(A) Because each student leaving the cafeteria was randomly selected and could choose to answer or not, this is a random sample of the student population, and the 89% is an accurate measurement of the school population's view of the new menu.

(B) Because students self-selected whether to eat in the cafeteria, the sampling method might be biased and the sample might not be representative of all students in the school.

(C) The survey would have been more effective if the reporter had collected the data in one 15-minute time period rather than in one 30-minute time period.

(D) The survey would have been more effective if students who cared about the food could have called the reporter to tell how they felt about the new menu, so that only students with opinions on the subject would have been surveyed.

(E) Because no treatment was imposed on the students eating in the cafeteria, one cannot make any conclusions about the new menu.

2014

3. A well-designed experiment should have which of the following characteristics?

I. Subjects assigned randomly to treatments

II. A control group or at least two treatment groups

III. Replication

(A) I only

(B) I and II only

(C) I and III only

(D) II and III only

(E) I, II, and III

6. Approximately 52 percent of all recent births were boys. In a simple random sample of 100 recent births, 49 were boys and 51 were girls. The most likely explanation for the difference between the observed results and the expected results in this case is

(A) bias
(B) variability due to sampling
(C) nonsampling error
(D) a sampling frame that is incomplete
(E) confounding

21. In a recent poll of 1,500 randomly selected eligible voters, only 525 (35 percent) said that they did not vote in the last election. However, a vote count showed that 80 percent of eligible voters actually did not vote in the last election. Which of the following types of bias is most likely to have occurred in the poll?

(A) Nonresponse bias

(B) Sampling bias

(C) Selection bias

(D) Response bias

(E) Undercoverage bias

38. Which of the following distinguishes an observational study from a randomized experiment?

(A) In an observational study volunteers are always used, whereas in a randomized experiment a random sample is always taken from the population.

(B) In an observational study a random sample is always taken from the population, whereas in a randomized experiment volunteers are always used.

(C) In an observational study treatments are not randomly assigned, whereas in a randomized experiment treatments are randomly assigned.

(D) In an observational study a control group is never used, whereas in a randomized experiment a control group is always used.

(E) An observational study can be double-blind, whereas a randomized experiment can only be single-blind because the experimenter determines who is randomly assigned to each treatment.

2013

31. A recent study examined 699 car accidents in Toronto over a fourteen-month period. Records of phone-service providers were used to determine whether the driver was using a cell phone during or immediately before the accident. Overall, the researchers found that drivers using cell phones were 4.3 times as likely to have an accident as drivers who were not using cell phones. The result was statistically significant. Which of the following can be concluded from this study?

(A) Cell phone use increases the likelihood of a car accident.

(B) There is an association between cell phone use and accidents, but not necessarily a causal relationship.

(C) There is a correlation between cell phone use and accidents, but not necessarily an association.

(D) The association between cell phone use and accidents is negative.

(E) Cell phone use causes more accidents in Canada, but not necessarily in the United States.

33. A regional transportation authority is interested in estimating the mean number of minutes working adults in the region spend commuting to work on a typical day. A random sample of working adults will be selected from each of three strata: urban, suburban, and rural. Selected individuals will be asked the number of minutes they spend commuting to work on a typical day. Why is stratification used in this situation?

(A) To remove bias when estimating the proportion of working adults living in urban, suburban, and rural areas

(B) To remove bias when estimating the mean commuting time

(C) To reduce bias when estimating the mean commuting time

(D) To decrease the variability in estimates of the proportion of working adults living in urban, suburban, and rural areas

(E) To decrease the variability in estimates of the mean commuting time

34. A randomized block design will be used in an experiment to compare two lotions that protect people from getting sunburned. Which of the following should guide the formation of the blocks?

(A) Participants in the same block should receive the same lotion.

(B) Participants should be randomly assigned to the blocks.

(C) Participants should be kept blind as to which block they are in.

(D) Participants within each block should be as similar as possible with respect to how easily they get sunburned.

(E) Participants within each block should be as different as possible with respect to how easily they get sunburned.

2012, # 15

A polling firm is interested in surveying a representative sample of registered voters in the United States. The firm has automated its sampling so that random phone numbers within the United States are called. Each time a number is called, the procedure below is followed.

- If there is no response or if an answering machine is reached, another number is automatically called.
- If a person answers, a survey worker verifies that the person is at least 18 years of age.
- If the person is not at least 18 years of age, no response is recorded, and another number is called.
- If the person is at least 18 years of age, that person is surveyed.

Some people claim the procedure being used does not permit the results to be extended to all registered voters. Which of the following is NOT a legitimate concern about the procedure being used?

(A) Registered voters with children under the age of 18 years may be underrepresented in the sample.

(B) Registered voters with unlisted telephone numbers may be underrepresented in the sample.

(C) Registered voters who have more than one telephone number may be overrepresented in the sample.

(D) Registered voters who live in households consisting of more than one voter may be underrepresented.

(E) People who are not registered to vote may bias the sample results.

2012, # 12

In the design of a survey, which of the following best explains how to minimize response bias?

(A) Increase the sample size.

(B) Decrease the sample size.

(C) Randomly select the sample.

(D) Increase the number of questions in the survey.

(E) Carefully word and field-test survey questions.

2012, # 4

A bank surveyed all of its 60 employees to determine the proportion who participate in volunteer activities. Which of the following statements is true?

(A) The bank should not use the data from this survey because this is an observational study.

(B) The bank can use the result of this survey to prove that working for the bank causes employees to participate in volunteer activities.

(C) The bank did not select a random sample of employees, so the survey will not provide the bank with useful information.

(D) The bank would have to use the survey data to construct a confidence interval in order to estimate the proportion of employees who participate in volunteer activities.

(E) The bank does not need to use an inference procedure to determine the proportion of employees who participate in volunteer activities because the survey was a census of all employees.

2012, #11

The manager of a public swimming pool wants to compare the effectiveness of two laundry detergents, Detergent A and Detergent B, in cleaning the towels that are used daily. As each dirty towel is turned in, it is placed into the only washing machine on the premises. When the washing machine contains 20 towels, the manager flips a coin to determine whether Detergent A or Detergent B will be used for that load. The cleanliness of the load of towels is rated on a scale of 1 to 10 by a person who does not know which detergent was used. The manager continues this experiment for many days. Which of the following best describes the manager's study?

(A) A completely randomized design

(B) A randomized block design with Detergent A and Detergent B as blocks

(C) A randomized block design with the washing machine as the block

(D) A matched-pairs design with Detergent A and Detergent B as the pair

(E) An observational study

2007, # 2

In which of the following situations would it be most difficult to use a census?

(A) To determine what proportion of licensed bicycles on a university campus have lights

(B) To determine what proportion of students in a high school support wearing uniforms

(C) To determine what proportion of registered students enrolled in a college are employed more than 20 hours each week

(D) To determine what proportion of single-family dwellings in a small town have two-car garages

(E) To determine what proportion of fish in Lake Michigan are bass

2007, # 9

A television news editor would like to know how local registered voters would respond to the question, "Are you in favor of the school bond measure that will be voted on in an upcoming special election?" A television survey is conducted during a break in the evening news by listing two telephone numbers side by side on the screen, one for viewers to call if they approve of the bond measure, and the other to call if they disapprove. This survey method could produce biased results for a number of reasons. Which one of the following is the most obvious reason?

(A) It uses a stratified sample rather than a simple random sample.

(B) People who feel strongly about the issue are more likely to respond.

(C) Viewers should be told about the issues before the survey is conducted.

(D) Some registered voters who call might not vote in the election.

(E) The wording of the question is biased.

2007, # 20

Which of the following is NOT a characteristic of stratified random sampling?

(A) Random sampling is part of the sampling procedure.
(B) The population is divided into groups of units that are similar on some characteristic.
(C) The strata are based on facts known before the sample is selected.
(D) Each individual unit in the population belongs to one and only one of the strata.
(E) Every possible subset of the population, of the desired sample size, has an equal chance of being selected.

2002, # 15

A high school statistics class wants to conduct a survey to determine what percentage of students in the school would be willing to pay a fee for participating in after-school activities. Twenty students are randomly selected from each of the freshman, sophomore, junior, and senior classes to complete the survey. This plan is an example of which type of sampling?

(A) Cluster

(B) Convenience

(C) Simple random

(D) Stratified random

(E) Systematic

1997, # 9

To check the effect of cold temperature on the elasticity of two brands of rubber bands, one box of Brand A and one box of Brand B rubber bands are tested. Ten bands from the Brand A box are placed in a freezer for two hours and ten bands from the Brand B box are kept at room temperature. The amount of stretch before breakage is measured on each rubber band, and the mean for the cold bands is compared to the mean for the others. Is this a good experimental design?

(A) No, because the means are not proper statistics for comparison.
(B) No, because more than two brands should be used.
(C) No, because more temperatures should be used.
(D) No, because temperature is confounded with brand.
(E) Yes

1997, # 27

The student government at a high school wants to conduct a survey of student opinion. It wants to begin with a simple random sample of 60 students. Which of the following survey methods will produce a simple random sample?

(A) Survey the first 60 students to arrive at school in the morning.
(B) Survey every 10th student entering the school library until 60 students are surveyed.
(C) Use random numbers to choose 15 each of first-year, second-year, third-year, and fourth-year students.
(D) Number the cafeteria seats. Use a table of random numbers to choose seats and interview the students until 60 have been interviewed.
(E) Number the students in the official school roster. Use a table of random numbers to choose 60 students from this roster for the survey.