Statistics - Learning from Data 3rd edition Peck Test Bank

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Name:_____ Class:_____ Date:_____

Chapter 01 - Collecting Data

1. The entire collection of individuals or objects about which information is desired is called a sample.
   a. True
   b. False

ANSWER: False

2. A study is observational if the investigator observes the behavior of a response variable when one or more factors are manipulated.
   a. True
   b. False

ANSWER: False

3. Suppose you are part of a gardening club with fifty members, all of whom are growing a particular variety of tomatoes on a shared garden plot. Early in the growing season, you notice that tomatoes tended by some members were noticeably redder than the tomatoes tended by other club members. You recall that, at the start of the growing season, a new fertilizer became available and that some of the gardening club members started to use it on their tomatoes. Which of the following studies could enable you to determine whether the new fertilizer contributed to the redder tomatoes?
   a. Survey six of the fifty club members asking them if they used the new fertilizer and rate their tomato color.
   b. Survey all fifty club members asking them if they used the new fertilizer and rate their tomato color.
   c. Ask a group of six club members to plant more tomatoes with three members using only the new fertilizer and three members using only the old fertilizer.
   d. Survey the ten club members with the reddest tomatoes and ask them which fertilizer they used.

ANSWER: c

4. Which of the following statistical studies is observational?
   a. A group of students is surveyed to determine the percentage who believe in reincarnation.
   b. A random sample of students is shown a documentary on the evolution of reincarnation beliefs throughout human history. A second random sample is not shown in the documentary. The object of the study is to determine whether viewing the documentary affects belief in reincarnation.
   c. To determine whether vitamin C has any effectiveness at lessening the duration of the common cold, one set of cold sufferers is given no vitamin C, a second set is given 2 grams per day, and a third set is given 5 grams of vitamin C per day.
   d. To determine if a new regenerative injection therapy is effective for reducing knee arthritis pain, a randomly selected group of arthritis patients were randomly assigned to two groups. In one group, the patients received physical therapy plus the new regenerative injection therapy. In the other group, the patients received only physical therapy.

ANSWER: a

5. Which of the following statistical studies is an experimental study?
   I) A researcher observes the effect of alcohol consumption on reaction time by administering various quantities of alcohol to randomly selected subjects.
   II) A study is conducted to see if exposure to increased carbon dioxide levels increases tomato yield. Tomato plants are selected at random and then exposed to various doses of carbon dioxide.
   III) Two random samples of senior adults are selected. The first group watches a 30-minute presentation on Medicare fraud, while the other group does not watch the presentation. A survey is then administered to measure the level of confidence that subjects have in their healthcare providers.
   a. I and II only
   b. II and III only

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c. I and III only

d. I, II, and III

ANSWER: d

6. Suppose you would like to know the flavor of ice cream preferred by the students at your university. Which of the following studies would help you learn the preferred ice cream flavor of your university student population?

a. Survey a random sample of fifty students asking them their favorite ice cream flavor.

b. Conduct an experiment on fifty student volunteers where the volunteers are randomly assigned to different groups, each of which is asked to try a single flavor of ice cream and report how well they like it.

c. Survey a sample of fifty students from the freshman class asking them their favorite ice cream flavor.

d. Conduct an experiment on fifty students randomly selected students from the senior class. In the experiment, the participants are randomly assigned to different groups, each of which is asked to try a single flavor of ice cream and report how well they like it.

ANSWER: a

7. You're the owner of a bakery that produces cakes for special events. You're considering investing in new equipment that would enable you to create larger cakes with more elaborate decorations. Before investing in the new equipment, it is essential that you know whether or not your clients would pay more money for the larger, more elaborate cakes. You have 100 clients, all of whom would respond to an inquiry within the time frame in which you must decide whether or not to purchase the new equipment. Which of the following studies would give you the best insight into whether or not your client population would purchase the larger, more elaborately decorated cakes?

a. A survey of the next ten clients who contact you to order cakes

b. A survey of ten clients selected at random from a list of all your clients

c. A survey of the ten clients who placed the largest number of cake orders over the past year

d. A census of your clients

ANSWER: d

8. You're a veterinarian interested in the effect of brisk, daily walks on the health of large dogs. You take a survey of 100 dog owners and find that dogs taken for one or more brisk walks each day become ill less frequently. Which of the following describes this finding?

a. A statistic because it reflects data taken from the entire population of large dogs

b. A population parameter because it reflects data taken from a sample

c. A statistic because it reflects data taken from a sample

d. A population characteristic because the study was based on a census.

ANSWER: c

9. You live in an apartment building with 50 residents. You're investigating the effect of a new bus stop on the ability of your building's residents to arrive at work on time. You survey all 50 of the building's residents and ask them questions about their work arrival time since the new bus stop became available. Which of the following accurately describes the results of your survey?

a. A population characteristic because it was based on a census

b. A statistic because the sample did not include residents from buildings in other neighborhoods

c. A statistic because the sample was drawn from an easily available group

d. A population parameter because it was based on a sample of residents from the building

ANSWER: a

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Chapter 01 - Collecting Data

10. You're concerned about the concentration of nitrates in the drinking water wells in your city. There are 200 wells in your city. You take water from 58 of these wells and analyze the water to determine nitrate concentration. The average nitrate concentration from the 58 wells is 5 milligrams per liter. Which of the following accurately describes your 5 milligrams per liter average concentration?

a. A statistic because it is based on a sample of the city's wells.
b. A population characteristic because it is based on a sample from the city's wells.
c. A statistic because it was based on a census of the city's wells.
d. A population characteristic because it is based on a census of the city's wells.

ANSWER: a

11. Suppose you're the owner of a sewing supplies shop. You have an inventory of 50 thread packages in your store, some of which contain nylon fiber. You're interested in learning how many of the thread packages in your inventory contain nylon fiber. You perform a simple test for nylon fiber on all 50 packages of thread in your store and find that 10 of the 50 contain nylon fiber. Which of the following accurately describes the results of your survey?

a. A statistic because it is based on a sample of the shop's thread packages
b. A population parameter because it is based on a census of the shop's thread packages
c. A statistic because it was based on a census of the shop's thread packages
d. A population parameter because it is based on a sample of the shop's thread packages.

ANSWER: b

12. You're interested in learning about the typical body weight of residents in the small town where you live. The town has only 200 residents. You send out a questionnaire to all 200 residents asking them for their body weight in kilograms. All 200 residents reply with the requested data. You use the data supplied by all 200 residents to determine the typical body weight of your town's residents. Which of the following accurately describes the typical body weight you just determined?

a. A statistic because it was based on a sample of your town's residents
b. A population characteristic because it was based on a sample of your town's residents
c. A statistic because it was based on a census of your town's residents
d. A population parameter because it was based on a census of your town's residents

ANSWER: d

13. Which of the following are the advantages of a simple random sample in an observational study?

a. The sample can be drawn from an easily available group.
b. The sample statistics will be distinctly different from the population parameters.
c. All individuals in the population need not have the same chance of being included in the sample.
d. Your sample statistics will reflect the population characteristics.

ANSWER: d

14. A **simple random sample of size *n*** is a sample selected from a population in such a way that every different possible sample of this same size *n* has an equal chance of being selected.

a. True
b. False

ANSWER: True

15. As long as the sample size is small relative to the population, there is little practical difference between sampling with replacement and sampling without replacement.

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a. True
b. False

ANSWER: True

16. Many people have speculated that high school students who eat a meal before attending classes earn better grades than those who fast before class. You decide to evaluate this claim by surveying 20 high-school senior-year history students from each school in your city. Will the results of your survey predict the effect of pre-class meals on student grades?

a. Yes, because the survey data was based on a census
b. Yes, because the samples were drawn from easily available groups
c. No, because every student did not have an equal chance of being selected to participate in the survey
d. No, because the sample size was too small

ANSWER: c

17. Suppose you're an arborist responsible for the health of pine trees in the 20 public parks located throughout your city. Pine trees are present in all of the city's parks, and each neighborhood of your city contains a park. A colleague tells you that he suspects the pine trees for which you are responsible may have a disease. The disease can be accurately diagnosed by examining the color of the pine tree's needle leaves. You sample leaves from the 3 city parks nearest the waterfront. Will the results of your survey predict the health of the city parks' pine trees?

a. Yes, because the survey data was based on a census.
b. Yes, because the samples were drawn from easily available groups
c. No, because each of the city's parks did not have an equal chance of having its pine tree needles examined.
d. No, because the sample size was too small.

ANSWER: c

18. Suppose you're sampling with replacement from a population size of 100. How small must your sample size be for sampling without replacement to be viewed as equivalent?

a. 20
b. 1
c. 10
d. 2

ANSWER: c

19. Stratified sampling is a sampling method that involved no random sampling.

a. True
b. False

ANSWER: False

20. Clusters are non-overlapping sub-groups of a population consisting of diverse individuals.

a. True
b. False

ANSWER: True

21. In stratified random sampling, a population is first divided into non-overlapping, non-random sub-groups. Random samples are then selected from each subgroup.

a. True

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b. False

ANSWER: True

22. Which of the following sampling methods best describes the one used in the following study?
To analyze the level of employee satisfaction at stores in a certain large city, a grocery store chain selects eight store locations at random and surveys all employees at these locations.

a. Simple random sampling
b. Stratified random sampling
c. Cluster sampling
d. Systematic sampling

ANSWER: c

23. Which of the following sampling methods best describes the one used in the following study?
To analyze the hair length of fashion models at a large modeling agency, models' names were selected from the employee directory for a hair-length measurement. One model was selected randomly from the first 15 models listed in the directory, then every 15^{th} model after that in the employee directory was also selected.

a. Simple random sampling
b. Stratified random sampling
c. Cluster sampling
d. Systematic sampling

ANSWER: d

24. Nonresponse bias can occur when responses are not obtained from all individuals selected for inclusion in the sample.

a. True
b. False

ANSWER: True

25. Increasing sample size will generally eliminate bias in a sample.

a. True
b. False

ANSWER: False

26. Selection bias can occur if a study consists exclusively of volunteers.

a. True
b. False

ANSWER: True

27. Measurement (response) bias could result from which of the following?

I) An improperly calibrated assessment tool used to weigh survey responses
II) A survey that includes leading questions
III) Appearance or behavior of the person asking the survey questions

a. I and II only
b. II and III only
c. I and III only
d. I, II, and III

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ANSWER: d

28. Which of the following best summarizes "nonresponse bias"?
    a. A tendency for samples to differ from the corresponding population as a result of systematic exclusion of some part of the population
    b. A tendency for samples to differ from the corresponding population because data are not obtained from all individuals selected for inclusion in the samples
    c. A tendency for samples to differ from the corresponding population because the method of observation tends to produce values that differ from true values
    d. A bias on the part of the researcher towards those who chose not to participate in the survey

ANSWER: b

29. A question in a survey on consumer food preferences asks respondents to select their favorite flavor of ice cream from a list that only includes "chocolate" and "vanilla". Which of the following types of bias does this question include?
    a. Selection bias
    b. Measurement bias
    c. Nonresponse bias
    d. Response bias

ANSWER: c

30. To estimate the proportions of students who plan to purchase tickets to an upcoming school fundraiser, a high school decides to sample 100 students as they register for the spring semester. There are 2000 students at the school. Which of the following sampling plans would result in a simple random sample?
    a. Number the students from 1 to 2000 and then use random numbers to select 100 students.
    b. Survey the first 100 students to register
    c. Randomly select 100 students from a list of 950 female students at the school
    d. Select one of the first 20 students to register using a random number table and then select every 20^{th} student thereafter

ANSWER: a

31. Which of the following actions should be used to create a simple, random sample?
    I) Create a sampling frame which is essentially a list of objects or individuals in the population
    II) Identify each object or individual in the sample frame with a unique number
    III) Use a random number generator to select the sample
    a. I and II only
    b. II and III only
    c. I and III only
    d. I, II, and III

ANSWER: d

32. The owner of a dress shop wants to learn which customers would be interested in an upcoming sale event. The dress shop has 622 customers, but it is only practical to contact 20 regarding their interest in the sale event. The customer names and contact information are stored in a database that permits the assignment of unique numbers for each customer. Which of the following methods could be used to select a simple random sample for the survey?
    a. Select the first 20 customers in the database
    b. Sort the customers by age and select the first 20

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c. Use a random number generator to request 20 integers between 1 and 622 and use the customers corresponding to those numbers in the survey

d. Sort the customers by the date of their first purchase and select the first 20.

ANSWER: c

33. You have a population of 5000 objects which require quality testing. . Which of the following sample sizes is the largest sample size for which there would be little practical difference between sampling with replacement and sampling without replacement?

a. n = 2500

b. n = 1000

c. n = 500

d. n = 5

e. n – 10

ANSWER: c

34. Suppose you're responsible for measuring the length of juvenile fish in a fish hatchery. Your standard procedure requires that you base your measurement on the average of five fish selected from each tank. In order to avoid traumatizing the fish, your procedure further dictates that you select fish one at a time from each tank, measure the fish, and then immediately return it to the tank from which it was drawn. Your supervisor directs you to use a new procedure in which each sampled fish is returned to a different tank so that it cannot be re-sampled. You are concerned that the change in sampling will cause a difference in results. How many fish would need to be in each tank in order for the two sampling methods to be equivalent?

a. At least 50 fish

b. At least 500 fish

c. No more than 1000 fish

d. No more than 100 fish

ANSWER: a

35. Suppose you want to learn how often chemistry students attending a local college visit the student fitness center on campus. You interviewed students from the chemistry department who have an athletic build. Is the sample likely to be representative of the population of interest?

a. Yes, since every individual in the population has an equal chance of being selected for the sample.

b. No, since only students with an athletic build visit the gym.

c. No, since you did not interview students outside of the chemistry department.

d. No, since not every individual in the population has an equal chance of being selected for the sample.

ANSWER: d

36. Suppose you want to know how many times per month the people of Portland go shopping. You interview 50 people. You restrict your sampling to residents of a neighborhood adjacent to the downtown shopping district but select them randomly from residences within that district. Is your sample likely to be representative of the population of interest?

a. No, since the sample size is too small.

b. Yes, since every individual in the population has an equal chance of being selected into the sample.

c. No, since you did not interview people from other cities.

d. No, since not every individual in the population has an equal chance of being selected for the sample.

ANSWER: d

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37. Suppose you want to know the effect of vitamin C supplementation on the frequency and severity of seasonal colds for students living in dormitories on a particular large university campus. You use a computerized survey which is presented randomly to 50 of the 1000 dormitory residents when they log onto their computers each day. All dormitory residents have computers and all of them log onto their computers daily. Is your sample likely to be representative of the population of interest?

a. No, since the sample size is too small.

b. Yes, since every individual in the population has an equal chance of being selected into the sample.

c. Yes, because the sample size is large.

d. No, since not every individual in the population has an equal chance of being selected for the sample

ANSWER: b

38. Suppose you want to know how many of the students at your elementary school prefer dark chocolate over milk chocolate. There are 88 total students at your elementary school including those in kindergarten through fifth grade. In order to assess student chocolate-type preference, you conduct a survey of twenty students randomly selected from the third, fourth, and fifth-grade classes. Is your sample likely to be representative of the population of interest?

a. No, since the sample size is too small.

b. Yes, since every individual in the population has an equal chance of being selected into the sample.

c. Yes, because the sample size is large.

d. No, since not every individual in the population has an equal chance of being selected for the sample.

ANSWER: d

39. Suppose you own a coffee shop and are considering whether to feature a peppermint or a spearmint coffee drink for the winter holidays. You would like to survey your 150 regular customers to see what they prefer. You have a database of your regular customers, so you randomly select 50 customers and offer them a free coffee in return for answering the survey. All 50 of your sampled customers respond with their mint preference. Was your sample likely to have been representative of the population of interest?

a. No, since the sample size is too small.

b. Yes, since every individual in the population has an equal chance of being selected into the sample.

c. Yes, because the sample size is large.

d. No, since not every individual in the population has an equal chance of being selected for the sample.

ANSWER: b

40. Random assignment to treatments will guarantee groups that are exactly alike for experimental purposes.

a. True

b. False

ANSWER: True

41. Suppose you're evaluating the effect of using duck vs. chicken eggs on the cooking time of a cake made using a standard recipe. You'll be making four cakes with chicken eggs and four cakes with duck eggs and comparing the average of the four cooking times for each egg type. You have two different types of flour and two different sizes of cake pans. You know that both flour type and pan size can affect cooking time. Which of the following approaches would prevent the flour type and pan size from acting as confounding variables?

I) Use one flour type to make all the chicken egg cakes and the other flour type to make all the duck egg cakes.
II) Use the larger pans to make all the duck egg cakes and the smaller pans to make all the chicken egg cakes.
III) Ensure that both flour types and pan sizes are used to make both the chicken egg cakes and the duck egg cakes.

a. I only

b. II only

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c. II and III only

d. III only

ANSWER: d

42. You're evaluating the effect of three different bicycle tire brands (A, B, and C) on cycling speed for an average human commuter. You measure the time required for three different cyclists to ride a fixed route. The riding time is measured six times for each tire brand. Potentially confounding variables include rider strength, wind speed, and air temperature. Which of the following approaches would reduce the confounding effects of wind and rider strength?

I) Create a sequence of 18 trials and randomly assign each tire brand to one of the 18 trials.
II) Ensure that one rider completes all six of the timed rides for each tire brand.
III) Complete all six timed rides for tire brand A, then all six timed rides for tire brand B, and then all six timed rides for tire brand C.

a. I only

b. II only

c. I and II only

d. I, II and III

ANSWER: a

43. Suppose you're evaluating the effect of compost types on the growth rate of ornamental trees in a public garden. The growth rate of the ornamental trees varies with sunlight, soil drainage, and compost quality. You have batches of 3 different types of compost and 48 ornamental trees ready for planting. You have three available planting areas, one with plentiful sunlight and well-drained soil, one with shade and well-drained soil, one with shade and poorly-drained soil, and one with shade and well-drained soil. Which of the following experimental approaches would prevent sunlight and soil drainage from confounding the effects of the compost type?

I) Use each of the 3 compost types in a different planting area
II) Use all of the compost types in one of the planting areas
III) Use all three compost types in all 4 planting areas

a. I and II only

b. I only

c. II and III only

d. III only

ANSWER: d

44. Suppose you're evaluating the performance of two new styles of solar panels for residential electricity generation. You have twenty available panels of each style that you plan to use to run an experiment in which you'll compare the amount of electricity each panel style generates over a one-month period. The amount of electricity solar panels generate depends on the direction they face (orientation) and the amount of shading they receive. You have two sites available to install your test panels, including a south-facing roof with no shading and a north-facing field with partial shading. Which of the following solar panel installation plans will prevent the effects of orientation and shading from confounding the effects of solar panel type?

I) Install both types of panels at both of the sites
II) Install one type of solar panel at each of the two sites
III) Install both types of panels at either one or the two sites

a. I only

b. II and III only

c. III only

d. I and III only

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ANSWER: a

45. A placebo is identical in appearance to the treatment of interest, but contains no active ingredients.
    a. True
    b. False

ANSWER: True

46. A control group provides a baseline for comparison to a treatment group.
    a. True
    b. False

ANSWER: True

47. If both the subjects and the person measuring the response are aware of the assigned treatment, then single blinding is being used.
    a. True
    b. False

ANSWER: False

48. You're planning a study in which neither the subject nor the person measuring the response should be aware of the assigned treatment. Which of the following experiments should be used?
    a. Single-blind
    b. Double-blind
    c. Either single-blind or double-blind
    d. No blinding should be used

ANSWER: b

49. You're planning a study in which the person measuring the response should be aware of the assigned treatment, but the subject should not. Which of the following experiments should be used?
    a. Single-blind
    b. Double-blind
    c. Either single-blind or double-blind
    d. No blinding should be used

ANSWER: a

50. You have 80 volunteer subjects whom you must assign to four treatment groups for an experiment. Of the following methods, which would permit you to make a random assignment of your subjects to treatments?
    I) Assign equal numbers of men and women to each treatment group
    II) Assign subjects to treatment groups in the order in which they volunteered for the study
    III) Assign subjects by physically drawing from a container containing paper slips with a unique subject name on each slip .
    a. I only
    b. I and II only
    c. II only
    d. III only

ANSWER: d

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51. Which of the following should be considered when using a coin toss as a random mechanism for assigning subjects to treatments?

I) The experiment has only two treatments
II) The coin is not physically damaged such that it fails to act as a random mechanism
III) Unequal treatment group sizes are acceptable

a. I only
b. I and II only
c. I, II, and III
d. III only

ANSWER: c

52. Suppose you are assigning subjects to treatments in an experimental study. Of the following strategies, which will ensure that subjects are assigned randomly?

I) Physically draw experimental units from a container
II) Use a random number generator
III) Use a random mechanism such as a coin

a. I and II only
b. II and III only
c. II only
d. I, II, and III

ANSWER: d

53. Suppose you planned to assign subjects to treatments by physically drawing experimental units from a container. Of the following issues, which could prevent random assignment from being achieved?

I) You fail to assign each subject a unique number
II) You fail to mix the paper slips containing subject numbers well

a. Both I and II
b. I only
c. II only
d. Neither I nor II

ANSWER: a

54. You have 30 subjects whom you need to randomly assign to three treatment groups. You plan to use a random number generator to randomly assign subjects to treatments. Of the following issues, which could prevent random assignment even though a random number generator is being used?

I) You fail to assign each subject a unique number
II) You ignore random numbers that correspond to already-assigned subjects

a. Neither I nor II
b. I only
c. II only
d. Both I and II

ANSWER: b

55. In a well-designed experiment, the factors are confounded whenever possible.

a. True
b. False

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ANSWER: True

56. Random assignment of volunteers should result in comparable experimental groups.
    a. True
    b. False

ANSWER: True

57. A group of physical therapists investigated the effect of home exercise on back pain reduction in females aged 45-65 years. The study recruited 100 volunteers who chose to perform either a 20-minute or a 40-minute exercise routine daily for one month and then reported the effect on their back pain using a standard scale. At the end of one month, participants who exercised for 20 minutes had a significantly higher pain reduction than those who exercised for 40 minutes. The therapists conducting the study concluded that a 20-minute exercise routine would reduce back pain for females aged 45-65 years. Based on the study design, do you think that the conclusions are reasonable?
    a. The conclusions are reasonable because this was an experiment with a control group.
    b. The conclusions are not reasonable because this was not an experiment with random assignment of subjects to experimental groups.
    c. The conclusions are not reasonable because this was an observational study.
    d. The conclusions are reasonable because this was an experiment with random assignment of subjects to experimental groups.

ANSWER: b

58. Suppose you're conducting an experiment to determine whether drinking a particular herbal tea every morning improves afternoon alertness. You recruit 50 volunteers and randomly assign 25 each to a group that drinks the herbal tea and a control group that drinks plain water. At the end of the one-month study, subjects in the herbal tea group report greater afternoon alertness compared to the control group. Based on the study design, do you think that the conclusion that the particular herbal tea improves afternoon alertness is reasonable?
    a. The conclusion is reasonable because this was an experiment with a control group.
    b. The conclusion is not reasonable because a placebo group was not included.
    c. The conclusion is not reasonable because this was an observational study.
    d. The conclusion is reasonable because this was an experiment with random assignment of subjects to experimental groups.

ANSWER: b

59. A group of dieticians conducted a study to determine whether grapefruit juice or cranberry juice was more effective for preventing seasonal flu. The dieticians randomly sampled 200 people from their local community and asked if they would like to participate in a study about the benefits of juice for flu prevention. The participants were randomly assigned to three treatment groups. In the first group, participants were asked to drink three glasses of grapefruit juice per day, in the second group participants were asked to drink three glasses of cranberry juice per day, and in the third group, participants were asked to avoid both grapefruit and cranberry juice. The study ran for three months corresponding to the flu season in the area. At the end of the study, subjects reported the frequency with which they contracted the flu. There were no significant differences between the cranberry juice group and the grapefruit juice group, and neither was there any difference between either juice group and the no-juice group. Based on these results, the dieticians concluded that neither grapefruit juice nor cranberry juice was effective in preventing seasonal flu. Do you think this conclusion is reasonable?
    a. The conclusion is not reasonable because this was an observational study.
    b. The conclusion is reasonable because a placebo group was included.
    c. The conclusion is reasonable because this was an experiment with random assignment of subjects to

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experimental groups.

d. The conclusion is not reasonable because the study did not include a control group.

ANSWER: c

60. One hundred and fifty people who live in a large city in the United States volunteered to participate in a statistical study. The volunteers were divided into two groups, with people who had children in group 1 and people without children in group 2. Those in group 1 were asked to eat a lemon slice daily for five months. Those in group 2 were asked not to eat lemon for five months. At the end of the study, it was found that on average, people in group 1 were sick less often than those in group 2. Did the study use a random selection process from some populations? Did the study use random assignment to experimental groups?

a. The study used both random selection and random assignment.

b. The study used neither random selection nor random assignment.

c. The study used random selection but did not use random assignment.

d. The study used random assignment but did not use random selection.

ANSWER: b

61. You're a math educational researcher interested in the effectiveness of a new undergraduate math curriculum on the graduation rates of engineering students worldwide. You conduct a study in which you recruit volunteers from five elite universities in the United States. You assign your female volunteers to a group that uses the new math curriculum and your male volunteers to a group that uses a traditional math curriculum. At the end of the study, you find no effect of the new math curriculum on graduation rates. Did the study use a random selection process from the population of interest? Did the study use random assignment to experimental groups?

a. The study used random assignment but did not use random selection.

b. The study used random selection but did not use random assignment.

c. The study used neither random selection nor random assignment.

d. The study used both random selection and random assignment.

ANSWER: c

62. Five hundred randomly selected Seattle residents participated in a survey to assess the effects of daily exercise on the severity of seasonal depression resulting from reduced daylight hours during the winter months. The participants completed a survey asking if they engaged in daily exercise as well as the frequency with which they experienced depression during the months of November, December, and January compared to the other nine months of the year. Part of the introductory survey information included references to prior studies which concluded that frequent exercise was very effective for reducing seasonal depression. Could the study result be used to draw conclusions regarding the effects of daily exercise on seasonal depression in the general population?

a. Yes, because the study included participants from an area that experiences seasonally reduced daylight hours.

b. Yes, because study participants were randomly selected.

c. No, because the study did not include participants from areas that do not experience seasonally reduced daylight hours.

d. No, because the survey's introductory information could influence the participants' responses.

ANSWER: d

63. Coaches for a college track team conducted a study regarding the effectiveness of barefoot training for injury prevention in college track athletes. Surveys were sent to 50 male freshman track athletes randomly selected from ten major universities at the end of their first competitive season asking them to report the footwear (or lack thereof) they used for training as well as the number of lower body injuries they sustained during both training and competition. The survey results showed that the use of shoes during training and competition significantly increased the incidence of lower

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body injuries among the study participants. Can the results of this study be used to conclude that barefoot training is effective for preventing injury in the population of college track athletes?

a. No, because the sample size was too small.

b. Yes, because participants were randomly selected.

c. No, since not every individual in the population had an equal chance of being selected for the sample.

d. Yes, because the study was observational.

ANSWER: c

64. You're a pain management specialist interested in the effect of a new treatment on back pain reduction in males aged 40-60 years. You conduct a study in which you recruit 100 men between the ages of 40 and 60 years, all of whom are of normal weight. The men aged 40 to 50 years receive the new treatment, while the men aged 50 to 60 years do not receive the treatment. At the end of the study, you ask all the study participants to assess their back pain. You find that the group that received the treatment had a significantly greater back pain reduction than the group that did not receive the treatment. Did the study use a random selection process from the population of males aged 40-60 years? Did the study use random assignment to experimental groups?

a. The study used both random selection and random assignment.

b. The study used neither random selection nor random assignment.

c. The study used random selection but did not use random assignment.

d. The study used random assignment but did not use random selection.

ANSWER: b

65. Two hundred people who live in San Francisco volunteered to participate in a statistical study. The volunteers were divided into two groups by age, with people under 40 years of age in group 1 and people 40 years of age and older in group 2. Those in group 1 were asked to participate in sports once a day for 1 month. Those in group 2 were asked to abstain from participating in sports for 1 month. At the end of the month, progress in weight reduction was significantly higher for group 1 than for group 2. From the resulting data, the researchers concluded that daily sports exercises would help every San Francisco resident lose weight faster. Based on the study design, do you think that the conclusions are reasonable?

a. The conclusions are reasonable because the study was an experiment.

b. The conclusions are not reasonable because this was not an experiment with random assignment of subjects to experimental groups.

c. The conclusions are not reasonable because this was an observational study.

d. The conclusions are reasonable because this was an experiment with random assignment of subjects to experimental groups.

ANSWER: b

66. In August 1994, wildlife biologists compared daytime and nighttime counts of wild brook trout, brown trout, and rainbow trout by the same snorkelers in five streams. Overall, the snorkelers counted 109 trout in the daytime and 333 trout at night. From these counts, biologists concluded that trout migrated to deep portions of the stream during the daytime. Based on the study design, do you think that this conclusion is correct?

a. The conclusions are reasonable because the study was an experiment.

b. The conclusions are not reasonable because this was not an experiment with random assignment of subjects to experimental groups.

c. The conclusions are not reasonable because this was an observational study.

d. The conclusions are reasonable because this was an experiment with random assignment of subjects to experimental groups.

ANSWER: c

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67. A group of psychology students conducted a study to determine whether wearing brightly colored shirts to class improved scores on graded in-class exercises. They randomly selected 100 students to participate in the study and allowed each participant to choose whether to wear a neutral-colored shirt or brightly colored shirt to class during a week in which several graded in-class exercises were conducted. The results showed no significant differences in the grades for the neutral vs. brightly colored shirt groups. The students conclude that wearing bright shirt colors to class does not improve assignment scores. Based on the study design, do you think that this conclusion is reasonable?

a. The conclusions are reasonable because the study was an experiment.
b. The conclusions are not reasonable because this was not an experiment with random assignment of subjects to experimental groups.
c. The conclusions are not reasonable because this was an observational study.
d. The conclusions are reasonable because this was an experiment with a random selection of study participants.

ANSWER: b

68. Suppose you're interested in determining if a particular medical treatment is effective in reducing knee pain in women aged 50 years and over with a confirmed diagnosis of kneecap arthritis. Your study participants consisted of 500 volunteers, all of whom are women aged 50 years or older, regularly attend supervised knee exercise training classes, and have confirmed diagnoses of kneecap arthritis. You randomly assign 250 of your selected subjects into two groups including a group that receives the medical treatment and a group that does not. After the treatments have been completed, you assess the 500 study participants to determine whether or not their knee pain has changed. You find that the group which received the treatment showed a significant reduction in knee pain vs. the group which did not receive the treatment. Which of the following can you conclude?

a. The medical treatment was effective in reducing knee pain in the study participants.
b. The medical treatment is effective for reducing knee pain in women aged 50 years and over with kneecap arthritis.
c. It is not possible to conclude whether or not the medical treatment had an effect on kneecap arthritis pain.
d. It is not possible to conclude whether the medical treatment had an effect on kneecap arthritis pain in the study participants.

ANSWER: a

69. Suppose you are a physician interested in the effect of diet on arthritis pain in women over the age of 60 years. You conduct a study in which 500 women from your local area over 60 years of age with arthritis volunteer to participate. You randomly assign the volunteers to two groups. Each group is given a different diet they are asked to follow for six months. At the end of the study, the participants are asked to report the severity of their arthritis pain compared to their pain prior to starting the study. Participants following one of the two diets report a significant reduction in their arthritis pain while participants following the other diet report no reduction in their arthritis pain. From the study results, you can conclude that diet reduced arthritis pain in the study participants but you cannot conclude whether diet reduces arthritis pain in women over 60 years of age. Based on the study design, do you think these conclusions are reasonable?

a. The conclusions are reasonable because the study was an observation with random selection of study participants.
b. The conclusions are reasonable because the study was an experiment which included random selection of subjects and random assignment of subjects to experimental conditions.
c. The conclusions are reasonable because the study was an experiment which did not include random selection of subjects, but did include random assignment of subjects to experimental conditions.
d. The conclusions are not reasonable because the study was an observation without random selection of study participants.

ANSWER: c

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