

# Chapter 1 Exam A

Name \_\_\_\_\_

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

**Form a conclusion about statistical significance. Do not make any formal calculations. Either use the results provided or make subjective judgments about the results.**

- 1) Last year, the average math SAT score for students at one school was 475. The headmaster introduced new teaching methods hoping to improve scores. This year, the mean math SAT score for a sample of students was 481. Is there statistically significant evidence that the new teaching method is effective? If the teaching method had no effect, there would be roughly a 3 in 10 chance of seeing such an increase. Does the result have statistical significance? Why or why not? Does the result have practical significance? 1) \_\_\_\_\_

**Provide an appropriate response.**

- 2) Why do you think that cluster sampling is frequently used in practice. 2) \_\_\_\_\_

**Use critical thinking to determine whether the sampling method appears to be sound or is flawed.**

- 3) "38% of adults in the United States regularly visit a doctor". This conclusion was reached by a college student after she had questioned 520 randomly selected members of her college. What is wrong with her survey? 3) \_\_\_\_\_

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

**Determine whether the given description corresponds to an observational study or an experiment.**

- 4) A stock analyst selects a stock from a group of twenty for investment by choosing the stock with the greatest earnings per share reported for the last quarter. 4) \_\_\_\_\_  
A) Experiment B) Observational study

**Identify which of these types of sampling is used: random, stratified, systematic, cluster, convenience.**

- 5) The name of each contestant is written on a separate card, the cards are placed in a bag, and three names are picked from the bag. 5) \_\_\_\_\_  
A) Random  
B) Cluster  
C) Convenience  
D) Stratified  
E) Systematic

- 6) To avoid working late, a quality control analyst simply inspects the first 100 items produced in a day. 6) \_\_\_\_\_  
A) Systematic  
B) Stratified  
C) Convenience  
D) Cluster  
E) Random

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

**Provide an appropriate response.**

- 7) A lawyer surveyed a simple random sample of his colleagues and asked them whether they were left-handed or right-handed. Is this convenience sample likely to provide results typical of all adults in the United States? Do convenience samples in general provide good results? 7) \_\_\_\_\_

**Identify the sample and population. Also, determine whether the sample is likely to be representative of the population.**

- 8) 100,000 randomly selected adults were asked whether they drink at least 48 oz of water each day and only 45% said yes. 8) \_\_\_\_\_

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

**Provide an appropriate response.**

- 9) An education expert is researching teaching methods and wishes to interview teachers from a particular school district. She randomly selects ten schools from the district and interviews all of the teachers at the selected schools. Does this sampling plan result in a random sample? Simple random sample? Explain. 9) \_\_\_\_\_
- A) No; no. The sample is not random because teachers in small schools are more likely to be selected than teachers in larger schools. It is not a simple random sample because some samples are not possible, such as a sample that includes teachers from schools that were not selected.
- B) Yes; yes. The sample is random because all teachers have the same chance of being selected. It is a simple random sample because all samples have the same chance of being selected.
- C) Yes; no. The sample is random because all teachers have the same chance of being selected. It is not a simple random sample because some samples are not possible, such as a sample that includes teachers from schools that were not selected.
- D) No; yes. The sample is not random because teachers in small schools are more likely to be selected than teachers in larger schools. It is a simple random sample because all samples have the same chance of being selected.

**Identify the type of observational study (cross-sectional, retrospective, prospective).**

- 10) A town obtains current employment data by polling 10,000 of its citizens this month. 10) \_\_\_\_\_
- A) Prospective      B) Retrospective      C) Cross-sectional      D) None of these

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

**Provide an appropriate response.**

- 11) Distinguish between categorical and quantitative data. Give an example for each. 11) \_\_\_\_\_

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

**Determine whether the given value is from a discrete or continuous data set.**

- 12) The height of 2-year-old maple tree is 28.3 ft. 12) \_\_\_\_\_
- A) Continuous      B) Discrete

**Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate.**

- 13) Student's grades, A, B, or C, on a test. 13) \_\_\_\_\_
- A) Interval      B) Nominal      C) Ordinal      D) Ratio

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

**Provide an appropriate response.**

- 14) Use the data in the table to answer the question. The x-values are amounts of saturated fat (in grams) in various regular two-ounce muffins. The y-values are amounts of saturated fat (in grams) in various "low fat" two-ounce muffins. 14) \_\_\_\_\_

Amounts of Saturated Fat in Regular and Low-Fat Muffins

x	3.7	4.9	4.3	6.4	4.2	4.5
y	1.2	2.1	2.2	1.9	1.4	2.4

Is each x-value matched with a corresponding y-value? That is, is each x-value associated with the corresponding y-value in some meaningful way? If the x- and y-values are not matched, does it make sense to use the difference between each x-value and the y-value that is in the same column?

- 15) Explain the difference between stratified and cluster sampling. 15) \_\_\_\_\_

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

**Identify which of these types of sampling is used: random, stratified, systematic, cluster, convenience.**

- 16) A tax auditor selects every 1000th income tax return that is received. 16) \_\_\_\_\_
- A) Stratified
  - B) Systematic
  - C) Random
  - D) Cluster
  - E) Convenience

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

**Use critical thinking to develop an alternative conclusion.**

- 17) A study shows that adults who work at their desk all day weigh more than those who do not. Conclusion: Desk jobs cause people to gain weight. 17) \_\_\_\_\_

**Provide an appropriate response.**

- 18) Would an observational study or an experiment be more appropriate to investigate the effects on humans of a substance known to be toxic? Explain. 18) \_\_\_\_\_

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

**Determine whether the given value is a statistic or a parameter.**

- 19) After inspecting all of 55,000 kg of meat stored at the Wurst Sausage Company, it was found that 45,000 kg of the meat was spoiled. 19) \_\_\_\_\_
- A) Statistic
  - B) Parameter

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

**Provide an appropriate response.**

- 20) Explain what is meant by the term "confounding" and give an example of an experiment in which confounding is likely to be a problem. 20) \_\_\_\_\_

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

**Determine whether the given value is from a discrete or continuous data set.**

- 21) The temperature of a cup of coffee is 67.3°F. 21) \_\_\_\_\_  
A) Continuous B) Discrete

**Solve the problem.**

- 22) On a test, 74% of the questions are answered correctly. If 111 questions are correct, how many questions are on the test? 22) \_\_\_\_\_  
A) 37 B) 67 C) 150 D) 74

**Identify the type of observational study (cross-sectional, retrospective, prospective).**

- 23) Researchers collect data by interviewing athletes who have won olympic gold medals from 1992 to 2008. 23) \_\_\_\_\_  
A) Retrospective B) Cross-sectional  
C) Prospective D) None of these

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

**Form a conclusion about statistical significance. Do not make any formal calculations. Either use the results provided or make subjective judgments about the results.**

- 24) Charlie's teacher claims that he does not study and just guesses on exams. On an exam with 201 true-false questions, Charlie answered 53.7% of the questions correctly. Calculations using these results show that if he were really just guessing, there would be roughly 1 chance in 7 that he would do this well. Is there statistically significant evidence against the teacher's claim that Charlie is just guessing? Why or why not? 24) \_\_\_\_\_

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

**Provide an appropriate response.**

- 25) A psychology student wishes to investigate differences in political opinions between business majors and political science majors at her college. She randomly selects 100 students from the 260 business majors and 100 students from the 180 political science majors. Does this sampling plan result in a random sample? Simple random sample? Explain. 25) \_\_\_\_\_  
A) Yes; yes. The sample is random because all students have the same chance of being selected. It is a simple random sample because all samples of size 200 have the same chance of being selected.  
B) No; yes. The sample is not random because political science majors have a greater chance of being selected than business majors. It is a simple random sample because all samples of size 200 have the same chance of being selected.  
C) No; no. The sample is not random because political science majors have a greater chance of being selected than business majors. It is not a simple random sample because some samples are not possible, such as a sample consisting of 50 business majors and 150 political science majors.  
D) Yes; no. The sample is random because all students have the same chance of being selected. It is not a simple random sample because some samples are not possible, such as a sample consisting of 50 business majors and 150 political science majors.

## Answer Key

### Testname: CHAPTER 1 EXAM A

- 1) No. The new mean SAT score is not substantially higher. Even if the new teaching method had no effect, a small increase such as this could easily be seen just by chance. No. The increase is not sufficient to be of practical significance.
- 2) Answers will vary. Possible answer: Cluster sampling can save time and money and be more efficient, especially when the clusters are geographically far apart from each other. For example, if a researcher wishes to interview a sample of high school teachers in a school district, it will be easier to interview all the teachers at a few schools than to interview a few teachers from many different schools.
- 3) The sample is biased. College students are not representative of the U.S. population as a whole.
- 4) B
- 5) A
- 6) C
- 7) Yes. There is nothing about left-handedness or right-handedness that would affect being one of the lawyer's colleagues. In terms of left- or right-handedness, a simple random sample of the lawyer's colleagues is likely to be representative of all adults in the United States. Convenience samples in general do not tend to provide good results as the sample is often not representative of a broader population.
- 8) Sample: the 100,000 selected adults; population: all adults; representative
- 9) C
- 10) C
- 11) Qualitative data can be separated into categories that are distinguished by nonnumeric characteristics. Quantitative data consist of numbers representing counts or measurements. Examples will vary.
- 12) A
- 13) C
- 14) The  $x$ -values are not matched with the  $y$ -values, so it does not make sense to use the differences between each  $x$ -value and the  $y$ -value that is in the same column.
- 15) In both cluster sampling and stratified sampling, sub-groups (clusters or strata) are formed. However, in stratified sampling, all strata are used and a sample is selected from each strata. In cluster sampling, a sample of the clusters is first selected, then all members of those clusters are selected.
- 16) B
- 17) Desk job workers are confined to their chairs for most of their work day. Other jobs require standing or walking around which burns calories. It is probably the lack of exercise that causes higher weights, not the desk job itself. Avoid causality altogether by saying lack of walking and exercise is associated with higher weights.
- 18) An observational study would be more appropriate. An experiment would not be appropriate because it would be unethical to administer as a treatment a substance known to be toxic. However a retrospective observational study, for example, could be carried out by examining records from the past and observing the effects where the substance had been accidentally ingested.
- 19) B
- 20) Confounding occurs in an experiment when the effects of two or more variables cannot be distinguished from each other. Examples will vary. One example is that of a school district that conducts a study regarding whether the science laboratory approach or the computer simulation approach is better for learning chemistry among seniors. A standardized achievement test is used to measure learning, and the results of the two schools are compared. Unless controlled in the study, two confounding variables are teaching expertise and student motivation.
- 21) A
- 22) C
- 23) A
- 24) No; The exam result of 53.7% is not substantially greater than 50%. Even if Charlie were just guessing, he could easily do this well just by chance.
- 25) C