

Chapter 1 Exam A

Name _____

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

- 1) Determine whether the given description corresponds to an experiment or an observational study. 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. 1) _____
A) Experiment B) Observational study
- 2) Identify which type of sampling is used. 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. 2) _____
A) Simple Random
B) Cluster
C) Convenience
D) Stratified
E) Systematic
- 3) Identify which type of sampling is used. To avoid working late, a quality control analyst simply inspects the first 100 items produced in a day. 3) _____
A) Systematic
B) Stratified
C) Convenience
D) Cluster
E) Simple Random
- 4) 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. 4) _____
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.
- 5) Identify the type of observational study used. A town obtains current employment data by polling 10,000 of its citizens this month. 5) _____
A) Prospective B) Retrospective C) Cross-sectional D) None of these
- 6) Determine whether the given value is a discrete or continuous variable. People are asked to state how many times in the last month they visited their family doctor. 6) _____
A) Continuous B) Discrete

- 7) Determine which of the four levels of measurement is most appropriate. Students' grades, A, B, or C, on a test. 7)_____
- A) Interval B) Nominal C) Ordinal D) Ratio
- 8) A tax auditor selects every 1000th income tax return that is received. Identify which of these types of sampling is used. 8)_____
- A) Stratified
B) Systematic
C) Simple Random
D) Cluster
E) Convenience
- 9) Determine whether the given value is a statistic or a parameter. Thirty percent of all dog owners poop scoop after their dog. 9)_____
- A) Statistic B) Parameter
- 10) Determine whether the given value is from a discrete or continuous data set. The time it takes a computer to complete a task. 10)_____
- A) Continuous B) Discrete
- 11) On a test, 74% of the questions are answered correctly. If 111 questions are correct, how many questions are on the test? 11)_____
- A) 37 questions B) 67 questions
C) 150 questions D) 82 questions
- 12) Researchers collect data by interviewing athletes who have won Olympic gold medals from 1992 to 2016. Identify the type of study. 12)_____
- A) Retrospective B) Cross-sectional
C) Prospective D) None of these
- 13) 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. 13)_____
- 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.
- 14) Correlation does not imply _____. 14)_____
- A) Linearity B) Bias C) Causation D) Significance

- 15) There are many potential pitfalls that can cause problems when analyzing data. Which of these choices are not classified as a potential pitfall? 15)_____
- A) Order of survey questions B) Nonresponse
C) Self-reported data D) Measured data
- 16) A management survey for a company surveyed 235 employees. 44.7% of the employees surveyed were females. The number of males would be _____. 16)_____
- A) 130 B) 105 C) 13 D) Unable to determine
- 17) What type of data values are quantitative and the number of values is finite or countable? 17)_____
- A) Interval B) Discrete C) Categorical D) Continuous
- 18) A _____ is the collection of data from every member of the population. 18)_____
- A) sample B) census C) placebo D) statistic
- 19) A _____ is the complete collection of all measurements or data collected, whereas, 19)_____
a _____ is a subcollection of members selected from the complete collection.
- A) population; sample B) sample; population
C) sample; census D) population; parameter
- 20) The four levels of measurement that are commonly used for classifying data are ratio, _____, _____, and _____. 20)_____
- A) interval, normal, ordinary B) nominal, ordinal, interval
C) nominal, ordinal, categorical D) normal, ordinal, interval

Answer Key

Testname: CHAPTER 1 EXAM A

- 1) B
- 2) A
- 3) C
- 4) C
- 5) C
- 6) B
- 7) C
- 8) B
- 9) B
- 10) A
- 11) C
- 12) A
- 13) C
- 14) C
- 15) D
- 16) A
- 17) B
- 18) B
- 19) A
- 20) B

- 9) Identify which type of sampling is used. A research team wants to study the demographics of college students in the U.S. using proportionate samples of students in majors reflecting actual U.S. percentages. 9) _____
- A) Convenience
 - B) Cluster
 - C) Stratified
 - D) Simple random
 - E) Systematic
- 10) A marijuana survey included 1610 responses from a list of approximately 241,500,000 adults in the U.S. from which every 150,000th name was surveyed. Identify which of these types of sampling is used: 10) _____
- A) Stratified
 - B) Cluster
 - C) Convenience
 - D) Systematic
 - E) Simple random
- 11) A gardener has 75 clients, 45% of whom are businesses. Find the number of business clients. 11) _____
- A) 41 clients
 - B) 34 clients
 - C) 36 clients
 - D) 73 clients
- 12) A marketing firm does a survey to find out how many people use a product. Of the one hundred people contacted, fifteen said they use the product. Identify the type of study used. 12) _____
- A) Experiment
 - B) Observational study
- 13) The similarity between an ordinal level of measurement and an interval level of measurement is that _____. 13) _____
- A) Both can be arranged in some order
 - B) Differences between data values cannot be determined or are meaningless
 - C) Differences between data values can be determined and are meaningful
 - D) Neither can be arranged in some order
- 14) Which of the following does not apply to the ratio level of measurement? 14) _____
- A) Can be arranged in order
 - B) Differences between data values can be found and are meaningful
 - C) Cannot be arranged in order
 - D) There is a natural zero starting point
- 15) Determine which level of measurement is appropriate. A sample of children's balls are classified from softest to hardest. 15) _____
- A) Interval
 - B) Ordinal
 - C) Ratio
 - D) Nominal
- 16) Determine which level of measurement is appropriate. Salaries of college professors. 16) _____
- A) Interval
 - B) Ordinal
 - C) Ratio
 - D) Nominal
- 17) Which of the following is an inappropriate way to deal with missing data? 17) _____
- A) Delete cases with missing data
 - B) Substitute missing values
 - C) Determine if missing values are random
 - D) Ignore missing data

- 18) In a cross-sectional study, data are _____ . 18) _____
- A) observed, measured, and collected at one point of time
 - B) observed, measure, and collected over a period of time
 - C) collected from a past time period
 - D) collected in the future from groups that share common factors
- 19) Which type of experiment separates subjects into groups that are similar but differ in ways that might affect the outcome of the experiment? 19) _____
- A) Completely randomized design
 - B) Randomized block design
 - C) Matched pairs design
 - D) Rigorously controlled design
- 20) The good design of experiments includes blinding, _____, and _____ . 20) _____
- A) replication; voluntary response samples
 - B) internalization; randomization
 - C) replication; experimentation
 - D) replication; randomization

Answer Key

Testname: CHAPTER 1 EXAM B

- 1) D
- 2) B
- 3) B
- 4) D
- 5) E
- 6) B
- 7) A
- 8) B
- 9) C
- 10) D
- 11) B
- 12) B
- 13) B
- 14) C
- 15) B
- 16) C
- 17) D
- 18) A
- 19) B
- 20) D

Chapter 1 Exam C

Name _____

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

- 1) 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?
- 2) Why do you think that cluster sampling is frequently used in practice? 2) _____
- 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 conclusion? 3) _____
- 4) Subscribers of the women's magazine Cosmopolitan are asked to participate in a survey about preferred cereals for breakfast. Are the results likely to be representative of all women? Of all subscribers of Cosmopolitan? Why or why not? 4) _____
- 5) Given the data in the table, what issue can be addressed by conducting a statistical analysis of the values? 5) _____

Amounts of Saturated Fat (in grams) in Two-Once Regular and Low-Fat Muffins

Regular	4.5	3.5	3.7	5.2	4.9	3.9
Low-Fat	1.2	2.1	2.2	1.8	1.6	2.2

- 6) At a school there are two different math classes for children of the same age. The two classes have different teachers. The school principal is interested in gauging the effectiveness of two different teaching methods and asks each teacher to try one of the methods. At the end of the semester both classes are given the same test and the results are compared. In this experiment, what is the variable of interest? Give some examples of variables which could be confounding variables. 6) _____
- 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) _____
- 8) Identify the sample and population. Also, determine whether the sample is likely to be representative of the population. A study is interested in whether men and women are equally likely to vote Democratic, Republican or Independent or not vote in a presidential election. Results were polled through a popular news website. 8) _____
- 9) Distinguish between categorical and quantitative data. Give an example of each. 9) _____
- 10) Explain why using self-reported data instead of measured data is a potential pitfall in data collection. Be sure to include an example. 10) _____
- 11) Explain the difference between stratified and cluster sampling. 11) _____

- 12) The table shows the weights (in pounds) and monthly incomes (in dollars) of nine randomly selected women between the ages of 18 and 65. 12)_____

Weight (lb)	113	132	155	122	166	140	118	129	185
Monthly Income (dollars)	1420	3650	5475	2310	4710	2910	1720	2460	4115

If we use statistical methods to conclude that there is a correlation (or relationship or association) between the weights of women and their monthly incomes, can we conclude that by increasing her weight a woman can increase her monthly income?

- 13) A teacher was interested in knowing how much tax people pay in the United States. She selected a simple random sample of her friends and asked them about their taxes. Is this sample likely to be representative of all adults in the United States? 13)_____

- 14) Would an observational study or an experiment be more appropriate to investigate the effects on humans of a substance known to be toxic? Explain. 14)_____

- 15) A coach uses a new technique in training middle distance runners. The times, in seconds, for 8 different athletes to run 800 meters before and after this training are shown below. 15)_____

Athlete	A	B	C	D	E	F	G	H
Before	115.2	114	116.4	119.8	110.9	112.4	111.5	117.3
After	112.9	112.7	114	120.6	109.1	109.1	107.9	113.4

Does the conclusion that the technique is effective appear to be supported with statistical significance? Does the conclusion that the technique is effective appear to have practical significance?

- 16) Why is cluster sampling frequently used in practice? 16)_____

- 17) Identify the sample and population. Also, determine whether the sample is likely to be representative of the population. An employee at the local ice cream parlor asks three customers if they like chocolate ice cream. 17)_____

- 18) Use critical thinking to develop an alternative conclusion. A study shows that the number of reported sexually transmitted diseases was significantly higher for high schools that offered courses in sex education than for high schools that did not. Conclusion: The introduction of sex education courses at the high school level has resulted in increased promiscuity among teens. 18)_____

- 19) Would an observational study or an experiment be more appropriate to investigate the effects on fertilizer on plant growth? Explain. 19)_____

- 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)_____

Answer Key

Testname: CHAPTER 1 EXAM C

- 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) Cluster sampling can save time and money and be more efficient, especially when the clusters are geographically far apart from each other. If a study wants to solicit opinions from the homeless population, it is more effective to choose a few selected towns and interview a significant number of homeless people in each town rather than study a few homeless people in all towns. A significant and similar sample are identified in each cluster. In this case, a study accessing the entire population through simple random sample would be too big and expensive.
In stratified sampling, the population is divided into strata according to some variables that are thought to be related to the variables of interest. A sample is taken from every stratum. There is not an identified variable of interest in the homeless study.
- 3) The sample is biased. College students are not representative of the U.S. population as a whole.
- 4) No. Cosmopolitan attracts women with specific demographics and subscribers will not be representative of all women, however, a sample well selected, will not be representative. No, this sample will not even be representative of all Cosmopolitan subscribers because it is a voluntary response sample - subscribers themselves choose whether to respond. Those with stronger opinions are more likely to respond so the sample is unlikely to be representative of all subscribers to the magazine.
- 5) Given the context of the data, we could address the issue of whether the two types of muffins provide the same amounts of saturated fat, or whether there is a difference between the two types of muffin.
- 6) The variable of interest is the teaching method. Possible confounding variables are "skill of teacher" (is one teacher better than the other?), "aptitude of students" (do the two classes have students of the same ability?), "amount of study time" (does one class have students who are more conscientious?).
- 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 individuals who responded to the website poll; population: all voting age adults; not representative due to being a convenience sample.
- 9) 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.
- 10) Answers will vary. Using self-reported data may be inaccurate since people may want to represent themselves in a certain way. For example, people often report that they weigh less than they actually do.
- 11) 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.
- 12) No. If a correlation (or relationship or association) is found, this doesn't mean that one variable is the cause of another. Larger weights do not cause higher incomes, but tend to be associated with higher incomes because both weight and income are associated with a third variable, age. Older women tend to be heavier and to have higher incomes than younger women.
- 13) 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.
- 14) 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.
- 15) Yes. Almost all runners have considerably faster times after the training. Yes. The differences appear to be substantial.
- 16) 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.
- 17) Sample: the 3 selected customers; population: all customers; not representative.

- 18) Sex education gives students information about sexual activities including the results of engaging in those activities, such as pregnancy and disease. Promiscuous behavior is more about a lack of information. This fallacy explanation is saying that since sex education is being taught in high schools, the teachings increase the promiscuity of teenagers. This is completely false because yes the teenagers are learning how to have safe and protective sex, but it's up to them and how they choose to use that information about sex to alter the cause of their promiscuity.
- 19) An experiment would be more appropriate..
- 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.