CHAPTER 1 SECTION 1: WHAT IS STATISTICS?

MULTIPLE CHOICE

1. You take a random sample of 100 students at your university and find that their average GPA is 3.1. If you use this information to help you estimate the average GPA for all students at your university, then you are doing what branch of statistics?
   a. Descriptive statistics
   b. Inferential statistics
   c. Sample statistics
   d. Population statistics

   ANS: B PTS: 1 REF: SECTION 1.1

2. A company has developed a new computer sound card whose average lifetime is unknown. In order to estimate this average, 200 sound cards are randomly selected from a large production line and tested; their average lifetime is found to be 5 years. The 200 sound cards represent a:
   a. parameter.
   b. statistic.
   c. sample.
   d. population.

   ANS: C PTS: 1 REF: SECTION 1.1

3. A company has developed a new computer sound card whose average lifetime is unknown. In order to estimate this average, 200 sound cards are randomly selected from a large production line and tested; their average lifetime is found to be 5 years. The 5 years represents a:
   a. parameter.
   b. statistic.
   c. sample.
   d. population.

   ANS: B PTS: 1 REF: SECTION 1.1

4. A descriptive measure that is computed from a sample is called a:
   a. parameter.
   b. statistic.
   c. population.
   d. sample.

   ANS: B PTS: 1 REF: SECTION 1.1

5. A summary measure that is computed from a population is called a:
   a. sample.
   b. statistic.
   c. population.
   d. parameter.

   ANS: D PTS: 1 REF: SECTION 1.1

6. Which of the following is a measure of the reliability of a statistical inference?
   a. A population parameter.
   b. A significance level.
   c. A descriptive statistic.
   d. A sample statistic.

   ANS: B PTS: 1 REF: SECTION 1.1

7. A politician who is running for the office of governor of a state with 4 million registered voters commissions a survey. In the survey, 54% of the 5,000 registered voters interviewed say they plan to vote for her. The population of interest is:
   a. the 4 million registered voters in the state.
   b. the 5,000 registered voters interviewed.
   c. the 54% who plan to vote for her.
   d. all the residents of the state.

   ANS: A PTS: 1 REF: SECTION 1.1

8. A company has developed a new battery and wants to estimate its average lifetime. A random sample of 500 batteries is tested and the average lifetime of this sample is found to be 225 hours. The 225 hours is the value of a:
   a. parameter.
   b. statistic.
   c. sample.
   d. population.

   ANS: B PTS: 1 REF: SECTION 1.1

9. The process of using sample statistics to draw conclusions about population parameters is called:
   a. finding the significance level.
   b. calculating descriptive statistics.
   c. doing inferential statistics.
   d. calculating the confidence level.

   ANS: C PTS: 1 REF: SECTION 1.1

10. Which of the following represents a population, as opposed to a sample?
    a. 1,000 respondents to a magazine survey which has 500,000 subscribers.
    b. The first 10 students in your class completing a final exam.
    c. Every fifth student to arrive at the book store on your campus.
    d. All registered voters in the State of Michigan.

    ANS: D PTS: 1 REF: SECTION 1.1

11. A researcher at Michigan State University (MSU) wants to estimate the average number of credits earned by students last semester at MSU. She randomly selects 500 students from last semester and finds that they averaged 14.85 credits per student. The population of interest to the researcher is:
    a. all MSU students.
    b. all college students.
    c. all MSU students enrolled last semester.
    d. the 500 MSU students selected at random.

    ANS: C PTS: 1 REF: SECTION 1.1

12. A study is under way to determine the average height of all 32,000 adult pine trees in a certain national forest. The heights of 500 randomly selected adult pine trees are measured and analyzed. The sample in this study is:
    a. the average height of the 500 randomly selected adult pine trees.
    b. the average height of all the adult pine trees in this forest.
    c. all the adult pine trees in this forest.
    d. the 500 adult pine trees selected at random from this forest.

    ANS: D PTS: 1 REF: SECTION 1.1

13. A study is under way to determine the average height of all 32,000 adult pine trees in a certain national forest. The heights of 500 randomly selected adult pine trees are measured and analyzed. The parameter in the study is:
    a. the average height of the 500 randomly selected adult pine trees.
    b. the average height of all the adult pine trees in this forest.
    c. all the adult pine trees in this forest.
    d. the 500 adult pine trees selected at random from this forest.

    ANS: B PTS: 1 REF: SECTION 1.1

14. How do confidence levels compare to significance levels?
    a. Confidence levels and significance levels are both typically small.
    b. Confidence levels and significance levels are both typically large.
    c. Confidence levels are typically small and significance levels are typically large.
    d. Confidence levels are typically large and significance levels are typically small.

    ANS: D PTS: 1 REF: SECTION 1.1

15. The *significance level* of a statistical inference measures:
    a. the proportion of times a conclusion about a population will be correct in the long run.
    b. the proportion of times a conclusion about a population will be wrong in the long run.
    c. the proportion of times an estimation procedure will be correct in the long run.
    d. the proportion of times an estimation procedure will be wrong in the long run.

    ANS: B PTS: 1 REF: SECTION 1.1

16. The *confidence level* of a statistical inference measures:
    a. the proportion of times a conclusion about a population will be correct in the long run.
    b. the proportion of times a conclusion about a population will be wrong in the long run.
    c. the proportion of times an estimation procedure will be correct in the long run.
    d. the proportion of times an estimation procedure will be wrong in the long run.

    ANS: C PTS: 1 REF: SECTION 1.1

TRUE/FALSE

17. The *significance level* measures the proportion of the time an inference about a population will be correct in the long run.

    ANS: F PTS: 1 REF: SECTION 1.1

18. A summary measure that is computed from a sample is called a statistic.

ANS: T PTS: 1 REF: SECTION 1.1

19. The *confidence level* is the proportion of times that an estimating procedure will be wrong in the long run.

ANS: F PTS: 1 REF: SECTION 1.1

20. A university employs 2,500 faculty and staff. To ascertain their employees' opinions of a proposed health insurance plan, 250 employees are surveyed at random. The proportion of the 250 employees who favor the health insurance plan represents a parameter in this scenario.

ANS: F PTS: 1 REF: SECTION 1.1

21. In a sample of 400 students selected from a large college of business, 30% are found to be marketing majors. The 30% is a statistic.

ANS: T PTS: 1 REF: SECTION 1.1

22. Twenty-five percent of a sample of 200 professional tennis players indicated that their parents did not play tennis. Based on this sample, we estimate that approximately 25% of the parents of all professional tennis players did not play tennis, plus or minus 5%. This is an example of using inferential statistics.

ANS: T PTS: 1 REF: SECTION 1.1

23. A population is the group of all items of interest to a statistics practitioner.

ANS: T PTS: 1 REF: SECTION 1.1

24. A statistic is typically a known quantity while a parameter is typically an unknown quantity.

ANS: T PTS: 1 REF: SECTION 1.1

25. Statistical inference is the process of making an estimate, prediction, or decision about a population based on sample data.

ANS: T PTS: 1 REF: SECTION 1.1

26. A descriptive measure of a population is called a parameter.

ANS: T PTS: 1 REF: SECTION 1.1

27. A descriptive measure of a sample is called a parameter.

ANS: F PTS: 1 REF: SECTION 1.1

28. You take a random sample to estimate a population mean and your results have a confidence level of 90%. That means the process you used will give you correct results 90% of the time.

ANS: T PTS: 1 REF: SECTION 1.1

COMPLETION

29. The Human Resources Director of a large insurance company wishes to develop a new employee health benefits package. She selects 400 employees at random and asks them about their preferences regarding their current health benefits package. The 400 employees selected is a(n) _____.

    ANS: sample

    PTS: 1 REF: SECTION 1.1

30. The Human Resources Director of a large insurance company wants to determine the percentage of all employees who favor a newly proposed benefits package. She selects 400 employees at random and finds that 75% approve the newly proposed package. The percentage of all employees of this company who favor the newly proposed package is a(n) _____.

    ANS: parameter

    PTS: 1 REF: SECTION 1.1

31. The Commissioner of Health in the State of California wanted to study malpractice litigation in Los Angeles. A sample of 32,000 medical records was selected from all 3.5 million patients who were discharged during the year 2003. Using the information from the sample to make conclusions about malpractice litigation in Los Angeles is an example of doing _____ statistics.

    ANS: inferential

    PTS: 1 REF: SECTION 1.1

32. Each of the following is a form of doing _____ statistics: 1) presenting your data using a graph; 2) calculating the mean of your sample; and 3) organizing your data into a table.

    ANS: descriptive

    PTS: 1 REF: SECTION 1.1

33. The Commissioner of Health in California State wanted to study malpractice litigation in Los Angeles last year. She randomly selected 32,000 medical records from the population of 3.5 million patients in Los Angeles last year. The proportion of malpractice claims filed from the 32,000 patients is an example of a(n) _____.

    ANS: statistic

    PTS: 1 REF: SECTION 1.1

34. The Human Resources Director at Michigan State University wishes to develop an employee benefits package. To get an idea of what components of a benefits package are most important, she selects 500 employees at random and asks them for their opinions. Numerically summarizing the preferences of these 500 employees is an example of doing _____ statistics.

    ANS: descriptive

    PTS: 1 REF: SECTION 1.1

35. The Human Resources Director at Michigan State University wishes to develop an employee benefits package. To get an idea of what components of a benefits package are most important, she selects 500 employees at random and asks them for their opinions. The group of all employees at MSU is known as the _____.

    ANS: population

    PTS: 1 REF: SECTION 1.1

36. The Commissioner of Health in California State wanted to study malpractice litigation in Los Angeles last year. She randomly selected 32,000 medical records from the population of 3.5 million patients in Los Angeles last year. From this sample, she calculated the proportion of litigations, the average amount of money involved per litigation, and the proportion of litigations resulting in a conviction. These calculations are all examples of doing _____ statistics.

    ANS: descriptive

    PTS: 1 REF: SECTION 1.1

SHORT ANSWER

37. At Grand Rapids Community College, administrators want to determine the average commuting distance for their students who commute to school. They randomly select 150 students who commute and ask them the distance of their commute to campus. From this group a mean of 18.2 miles is computed.

    a. Describe/find the parameter.
    b. Describe/find the statistic.
    c. Describe the population.
    d. Describe the sample.

    ANS:

    a. The mean commute distance for all commuting students at the college.
    b. 18.2 miles.
    c. All commuting students enrolled at the college.
    d. The 150 randomly selected commuting students.

    PTS: 1 REF: SECTION 1.1

38. Briefly describe the difference between a parameter and a statistic, and give an example of each.

    ANS:
    A parameter is a descriptive measure of a population, while a statistics is a descriptive measure of a sample.

    Examples: The mean number of soft drinks consumed last week by all students at the University of Michigan is a parameter; the mean number of soft drinks consumed last week by a sample of 250 students from the University of Michigan is a statistic.

    PTS: 1 REF: SECTION 1.1

39. Briefly describe the difference between a population and a sample and give an example of each.

ANS:
A population is the group of all items of interest to a statistics practitioner, while a sample is a set of data drawn from a population.

Examples: All students at the University of Michigan is a population, while 100 students randomly selected from the University of Michigan is a sample.

PTS: 1 REF: SECTION 1.1

40. What name do we give to a descriptive measure of a sample?

ANS:
A statistic.

PTS: 1 REF: SECTION 1.1

41. What name do we give to a descriptive measure of a population?

ANS:
A parameter.

PTS: 1 REF: SECTION 1.1

42. A manufacturer of children's toys wants to know what percentage of all of their toys are defective. When 500 of their toys are selected at random and examined, 0.5% are found to be defective.

a. Describe the population of interest.
b. Describe the sample.
c. Describe/find the parameter.
d. Describe/find the statistic.
e. Is the 0.5% a parameter or a statistic in this scenario? Why?

ANS:

a. All toys made by this manufacturer.
b. The 500 toys selected at random.
c. The proportion of all toys made by this manufacturer that are defective.
d. The proportion of the toys from the random sample that are defective: 0.5%.
e. The 0.5% represents the statistic, since it describes the sample.

PTS: 1 REF: SECTION 1.1

43. A lawyer who is running for the vacant City Mayor seat with 25,000 registered voters wants to determine what percentage would vote for her. Her pollsters interview 500 registered voters from the city at random; 55% say they plan to vote for her.

a. What is the population of interest?
b. What is the sample?
c. Is the 55% a parameter or a statistic in this scenario? Why?

ANS:

a. The 25,000 registered voters in that city.
b. The 500 registered voters selected at random.
c. The 55% is a statistic since it is a descriptive measure of the sample.

PTS: 1 REF: SECTION 1.1

44. Define each of the following statistical terms:

a. Descriptive statistics
b. Statistical inference
c. Confidence level
d. Significance level
e. Population
f. Sample

ANS:

a. Descriptive statistics is organizing, summarizing, and analyzing data to describe a sample.
b. Statistical inference is the process of making an estimate, prediction, or decision about a population based on sample data.
c. The confidence level is the proportion of times that an estimating procedure will be correct in the long run.
d. The significance level is the proportion of times that a conclusion about a population will be wrong in the long run.
e. A population is the group of all items of interest to a statistics practitioner.
f. A sample is a set of data drawn from the population.

PTS: 1 REF: SECTION 1.1

45. Identify each of the following as a use of descriptive statistics or inferential statistics.

a. Finding the weights of a sample of 75 manufacturer parts.
b. Calculating the average weight of 100 boxes shipped by UPS.
c. Estimating the percentage of the U.S. population that will vote for your favorite candidate in the next presidential election.
d. Selecting a random sample of 100 babies born last year and using this information to estimate the birth weight of all babies born last year.
e. Randomly selecting 100 cans of a brand of corn and using their average weight to decide whether the 16 oz. label on the cans is truthful or not.

ANS:

a. Descriptive statistics
b. Descriptive statistics
c. Inferential statistics
d. Inferential statistics
e. Inferential statistics

PTS: 1 REF: SECTION 1.1