CHAPTER 1
A PREVIEW OF BUSINESS STATISTICS

SECTION EXERCISES

1.1 d/p/e In ancient times, statistics was mainly employed for counting people or possessions in order to facilitate taxation.

1.2 d/p/m Statistical methods are useful in all facets of business today. Statistics can be used to describe information, to analyze data, to reach conclusions, and to make decisions.

1.3 d/p/m Descriptive statistics are used to summarize and describe a set of data. Inferential statistics are used to make generalizations, estimates, forecasts, or other judgments about the population from which the data (sample) is taken. Inferential statistics are involved when a state senator surveys some of her constituents in order to obtain guidance on how she should vote. She is using statistics to make judgments about the population based on the data from the sample.

1.4 d/p/m This represents descriptive statistics; we are summarizing and describing the data.

1.5 d/p/m This information represents inferential statistics since we are using information collected from a sample of 20 adults to make inferences about all adults.

1.6 d/p/e Qualitative variables or "attributes" involve counting the number of people or objects that fall within categories. Quantitative variables determine how much of something is possessed.

1.7 d/p/e Discrete quantitative variables can take on only certain values along an interval, with the values having gaps between them. Discrete variables are applicable when we want to count the number of times something occurs. Continuous quantitative variables can take on any value along an interval. Continuous variables are applicable when there are no gaps between the exact values which these variables can take on, such as weight, height, volume, or distance.

Note: In this solutions manual, exercises are categorized according to type, tools required, and level of difficulty:

Type:	Tools:	Difficulty:
d = definitional/conceptual	p = pencil	e = easy
c = computational	a = calculator	m = moderate
p = problem	c = computer	d = difficult

For example, "c/a/m" refers to an exercise that is computational in nature, requires a pocket calculator, and is judged to be moderate in difficulty. The classifications are of necessity subjective. We have attempted to specify the most basic tool that could be practical for the task. In some cases (e.g., simple regression), the pocket calculator can be used even though a computer statistical package (if available) is preferred. In other cases (e.g., multiple regression and analysis of variance), the computer is automatically specified as the required tool.

1.8 d/p/m

a. This information might be interpreted as a qualitative variable if we view it as expressing that the school is among those which have been accredited for the past 15 years versus those which have not been accredited for the past 15 years.
b. This information might be interpreted as a quantitative variable if we view it as counting the number of years the school has been accredited during the past 15-year period. For other locksmithing schools over the past 15 years, the number of years they have been accredited could be any integer value from 0 to 15.

1.9 d/p/m

a. This information is on the ordinal scale. The industries are viewed in terms of rank instead of the distance between them. However, we do not have a unit of measurement to describe how many more strikes Industry A has than Industry B.
b. This information is on the ratio scale. The industries can be viewed in terms of rank (C has lost fewer days per worker), and there is a unit of measurement enabling us to describe how many more days Industry D has lost per worker. Also, there is an absolute zero point and multiples are meaningful.

1.10 d/p/m

a. The lodge might give each guest a number to identify the state in which he or she resides.
b. The lodge could rank the rooms at the lodge from most attractive to least attractive.
c. The lodge could describe different months of the year according to their average temperatures.
d. The lodge could record the number of skiers at the lodge from each one of the New England states.

1.11 d/p/m The restaurant might be able to make decisions pertaining to such matters as the quality of food, the courtesy and number of employees, and the cleanliness of the restaurant.

1.12 d/p/m The company might report the percentage of burglaries in homes with their product versus the percentage in homes without their product. Hopefully, the former percentage is lower than the latter .

1.13 d/p/m The company may manipulate the data to show what it wants to show; for example, by distorting the scale on a graph to make a large deficit appear very small. Another possibility is to use a sample that is not representative of the population.

1.14 d/p/e You should ask yourself what benefits the person or company stands to gain from the conclusions reached by the study.

CHAPTER EXERCISES

1.15 d/p/m This information would represent inferential statistics, since a sample is used to make generalizations about the population.

1.16 d/p/m

a. Qualitative; you are in one category or the other.
b. Qualitative; you are in one category or the other.
c. Quantitative, discrete; the number of people that attended is countable (0, 1, 2, …).
d. Quantitative, discrete; the price can take on only certain values along an interval.
e. Quantitative, continuous; time can take on a value at any point along an interval.
f. Quantitative, discrete; the number of students that belong to a fraternity or sorority is countable.

1.17 d/p/m The amount of money paid out in premiums and the number of policies purchased in the previous year would play a role in how much you pay for your policy. Data such as the number of accidents, speeding tickets, or other moving violations you've had in the past few years could also play a role, as could data regarding accident or claim frequencies associated with the type of vehicle you drive.

1.18 d/p/m

a. Ratio scale; there is an absolute zero point associated with the number of employees.
b. Interval scale; there is no absolute zero point for temperature.
c. Nominal scale; we could use "1" to identify yes and "0" for no.
d. Ordinal scale; the cars are ranked but there is no measure for the distance between them.

1.19 d/p/m It will help them become more intelligent consumers of statistical claims and findings. Whether as citizens or as business professionals, such individuals will be better able to protect themselves from those in business or the media who may be either incompetent or unethical.

1.20 d/p/m

a. Major: nominal. Each major would be assigned a number.
b. Class: ordinal – Freshman, Sophomore, Junior, or Senior.
c. SAT score: interval. This value gives him a ranking and there is a unit of measurement, but multiples do not make sense. (The minimum total score is 400, not zero.)
d. The $30 used to buy a new calculator: ratio.

1.21 d/p/m

a. The population would be all 40 students who are enrolled in the English class. The sample would be the 5 students in the class that Roger questioned.
b. This is probably not a representative sample, since Roger chose 5 students that always sit in the back. They may all be friends or may have different opinions than those sitting in the front.

1.22 d/p/m

a. This information can be viewed as representing the nominal scale of measurement if we view the stocks in terms of returning more versus not returning more than the rate that had been expected.
b. This information can be viewed as representing the ratio scale of measurement. For example, a 40% rate for above-expected performance would be twice a 20% rate. There is an absolute zero, a unit of measurement (percentage point), and multiples are meaningful.