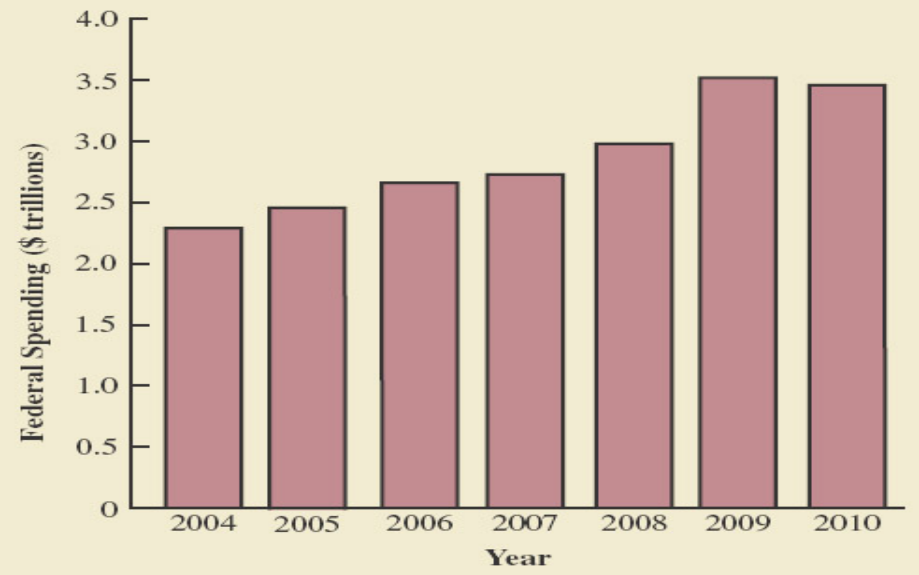
Chapter 1 Problems and Solutions - Data and Statistics

1. Discuss the differences between statistics as numerical facts and statistics as a discipline or field of study.

13. Figure 1.10 (based on earlier date, but the answer is the same) provides a bar chart showing the amount of federal spending for the years 2004 to 2010 (Congressional Budget Office website, May 15, 2011).

a. What is the variable of interest?
b. Are the data categorical or quantitative?
c. Are the data time series or cross-sectional?
d. Comment on the trend in federal spending over time.

Figure 10



14. The following data show the number of rental cars in service for three rental car companies: Hertz, Avis, and Dollar. The data are over a four year period and are in thousands of vehicles.

Cars in Service (1000s)

Company	Year 1	Year 2	Year 3	Year 4
Hertz	327	311	286	290
Dollar	167	140	106	108
Avis	204	220	300	270

a. Construct a time series graph for the years 1 to 4 showing the number of rental cars in service for each company. Show the time series for all three companies on the same graph.
b. Comment on who appears to be the market share leader and how the market shares are changing over time.
c. Construct a bar chart showing rental cars in service for Year 4. Is this chart based on cross-sectional or time series data?

19. A *Bloomberg Businessweek* North American subscriber study collected data from a sample of 2861 subscribers. Fifty-nine percent of the respondents indicated an annual income of $75,000 or more, and 50% reported having an American Express credit card.

a. What is the population of interest in this study?
b. Is annual income a categorical or quantitative variable?
c. Is ownership of an American Express card a categorical or quantitative variable?
d. Does this study involve cross-sectional or time series data?
e. Describe any statistical inferences *Bloomberg Businessweek* might make on the basis of the survey.

24. A sample of midterm grades for five students showed the following results: 72, 65, 82, 90, 76.

Which of the following statements are correct, and which should be challenged as being too generalized?

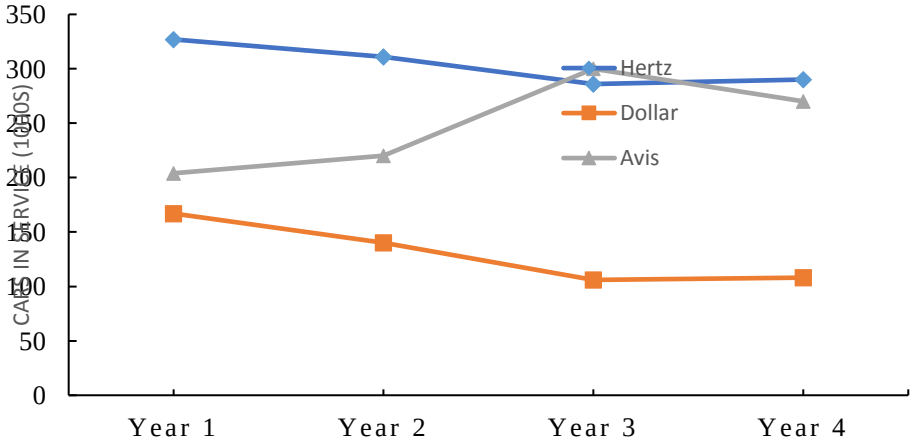
a. The average midterm grade for the sample of five students is 77.
b. The average midterm grade for all students who took the exam is 77.
c. An estimate of the average midterm grade for all students who took the exam is 77.
d. More than half of the students who take this exam will score between 70 and 85.
e. If five other students are included in the sample, their grades will be between 65 and 90.

Chapter 1 Solutions

1. Statistics can be referred to as numerical facts. In a broader sense, statistics is the field of study dealing with the collection, analysis, presentation and interpretation of data.

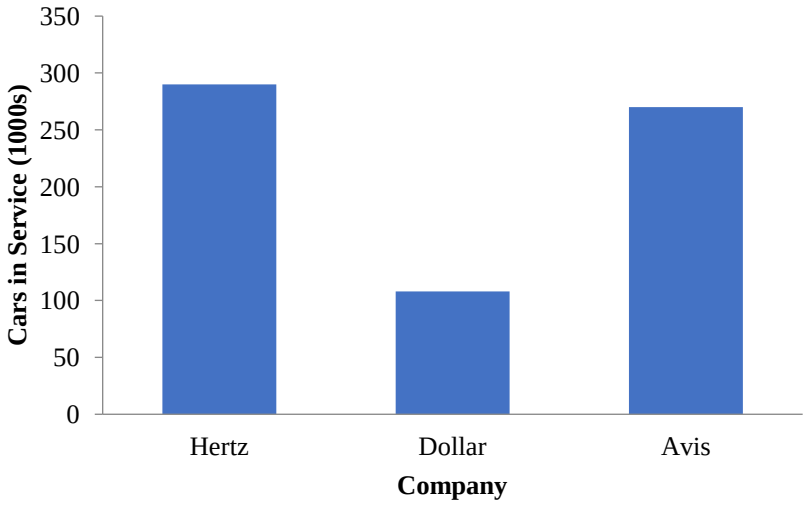
13. a. a. Quantitative
b. Time series
c. Federal spending ($ trillions)
d. Federal spending appears to be increasing over time

14. a. The graph of the time series follows:



b. In Year 1 and Year 2 Hertz was the clear market share leader. In Year 3 and Year 4 Hertz and Avis have approximately the same market share. The market share for Dollar appears to be declining.

c. The bar chart for Year 4 is shown below.



This chart is based on cross-sectional data.

19. a. All subscribers of Business Week in North America at the time the survey was conducted.
b. Quantitative
c. Categorical (yes or no)
d. Crossectional - all the data relate to the same time.
e. Using the sample results, we could infer or estimate 59% of the population of subscribers have an annual income of $75,000 or more and 50% of the population of subscribers have an American Express credit card.

24. a. This is a statistically correct descriptive statistic for the sample.
b. An incorrect generalization since the data was not collected for the entire population.
c. An acceptable statistical inference based on the use of the word “estimate.”
d. While this statement is true for the sample, it is not a justifiable conclusion for the entire population.
e. This statement is not statistically supportable. While it is true for the particular sample observed, it is entirely possible and even very likely that at least some students will be outside the 65 to 90 range of grades.