Essentials of Statistics for Business and Economics 9th edition Anderson Solutions Manual

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Chapter 1

Data and Statistics

Learning Objectives

1. Obtain an appreciation for the breadth of statistical applications in business and economics.
2. Understand the meaning of the terms elements, variables, and observations as they are used in statistics.
3. Obtain an understanding of the difference between categorical, quantitative, cross-sectional, and time-series data.
4. Learn about the sources of data for statistical analysis both internal and external to the firm.
5. Be aware of how errors can arise in data.
6. Know the meaning of descriptive statistics and statistical inference.
7. Be able to distinguish between a population and a sample.
8. Understand the role a sample plays in making statistical inferences about the population.
9. Know the meaning of the term data mining.
10. Be aware of ethical guidelines for statistical practice.

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.
2. a. The 10 elements are the 10 tablet computers

   b. Five variables: Cost ($), Operating System, Display Size (inches), Battery Life (hours), and CPU Manufacturer

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c Categorical variables: Operating System and CPU Manufacturer

Quantitative variables: Cost ($), Display Size (inches), and Battery Life (hours)

d.

Variable	Measurement Scale
Cost ($)	Ratio
Operating system	Nominal
Display size (inches)	Ratio
Battery life (hours)	Ratio
CPU manufacturer	Nominal

3. a. Average cost = 5829/10 = $582.90

b. Average cost with a Windows operating system = 3616/5 = $723.20

Average cost with an Android operating system = 1,714/4 = $428.5

The average cost with a Windows operating system is much higher.

c. Ten of 10 or 20% use a CPU manufactured by TI OMAP

d. Four of 10 or 40% use an Android operating system

4. a. There are eight elements in this data set; each element corresponds to one of the eight models of cordless telephones.

b. Categorical variables: Voice Quality and Handset on Base

Quantitative variables: Price, Overall Score, and Talk Time

c. Price: ratio measurement

Overall score: interval measurement

Voice quality: ordinal measurement

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Handset on base: nominal measurement

Talk time: ratio measurement

5. a. Average price = 545/8 = $68.13

   b. Average talk time = 71/8 = 8.875 hours

   c. Percentage rated Excellent: 2 of 8, 2/8 = .25, or 25%

6. a. Categorical

   b. Quantitative

   c. Categorical

   d. Quantitative

   e. Quantitative

7. a. Because there are five choices, the response is a categorical response.

   b. The five responses are the labels for the customer responses. A nominal scale is being used.

8. a. 762

   b. Categorical

   c. Percentages

   d. .67(762) = 510.54

   510 or 511 respondents said they want the amendment to pass.

9. a. The population is employed individuals in the United States aged 25–29.

   b. Have you earned a bachelor's degree (or higher)?

   c. Because the response is yes or no, the response is categorical.

10. a. Categorical

    b. Percentages

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c. 44 of 1080 respondents, approximately 4%, strongly agree with allowing drivers of motor vehicles to talk on a hand-held cell phone while driving.

d. 165 of the 1,080 respondents or 15% of said they somewhat disagree and 741 or 69% said they strongly disagree. Thus, there does not appear to be general support for allowing drivers of motor vehicles to talk on a hand-held cell phone while driving.

11. a. Since these are years, categorical.

b. .53(1,503) = 796.59 or approximately 797

c. .10(1,503) = 150.3 or approximately 150

12. a. The population is all visitors coming to the state of Hawaii.

b. Because airline flights carry the vast majority of visitors to the state, the use of questionnaires for passengers during incoming flights is a good way to reach this population. The questionnaire actually appears on the back of a mandatory plants and animals declaration form that passengers must complete during the incoming flight. A large percentage of passengers complete the visitor information questionnaire.

c. Questions 1 and 4 provide quantitative data indicating the number of visits and the number of days in Hawaii. Questions 2 and 3 provide categorical data indicating the categories of reason for the trip and where the visitor plans to stay.

13. a. Facebook worldwide advertising revenue.

b. Quantitative

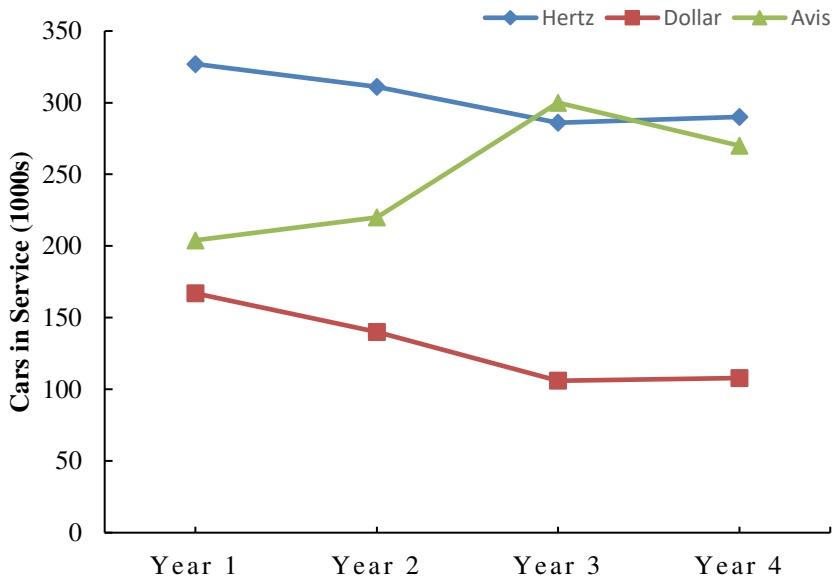
c. Time series

d. Facebook advertising revenue is increasing at an increasing rate over time.

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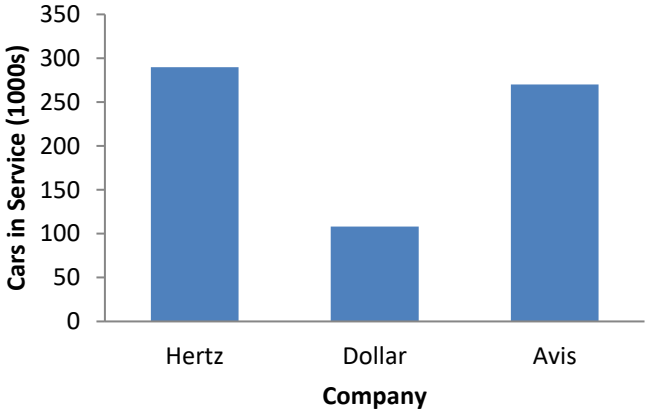
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14. a. The graph of the time series follows:



b. In 2007 and 2008, Hertz was the clear market share leader. In 2009 and 2010, Hertz and Avis have approximately the same market share. The market share for Dollar appears to be declining.

c. The bar chart for 2010 follows, based on cross-sectional data.



15. a. Quantitative: jewelry sales in millions of dollars

b. Time series

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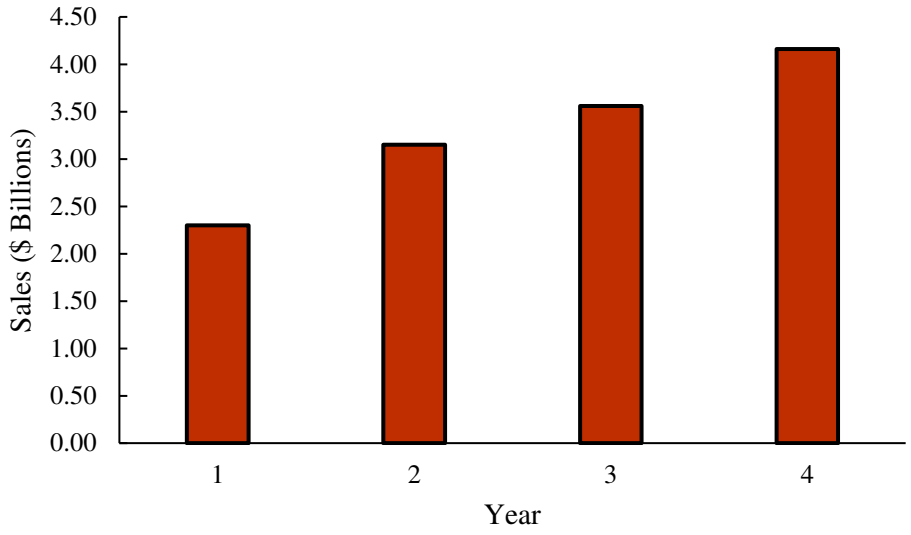
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c. February, May, November, and December

d. November and December are likely the result of Christmas sales. February is likely the result of Valentine's Day. May's numbers are perhaps the result of gifts for graduations and Mother's Day.

16. a. Time series

b.



c. Sales appear to be increasing in a linear fashion.

17. Internal data on salaries of other employees can be obtained from the personnel department. External data might be obtained from the Department of Labor or industry associations.

18. a. 684/1,021; or approximately 67%

b. 612

c. Categorical

19. a. All subscribers of *Businessweek* in North America at the time the survey was conducted.

b. Quantitative

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c. Categorical (yes or no)

d. Cross-sectional: all 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.

20. a. 43% of managers were bullish or very bullish; 21% of managers expected health care to be the leading industry over the next 12 months.

b. We estimate the average 12-month return estimate for the population of investment managers to be 11.2%.

c. We estimate the average over the population of investment managers to be 2.5 years.

21. a. The two populations are the population of women whose mothers took the drug DES during pregnancy and the population of women whose mothers did not take the drug DES during pregnancy.

b. It was a survey.

c. 63 / 3.980 = 15.8 women out of each 1,000 developed tissue abnormalities.

d. The article reported “twice” as many abnormalities in the women whose mothers had taken DES during pregnancy. Thus, a rough estimate would be 15.8/2 = 7.9 abnormalities per 1,000 women whose mothers had *not* taken DES during pregnancy.

e. In many situations, disease occurrences are rare and affect only a small portion of the population. Large samples are needed to collect data on a reasonable number of cases where the disease exists.

22. a. The population consists of all clients who currently have a home listed for sale with the agency or who have hired the agency to help them locate a new home.

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b. Some of the ways that could be used to collect the data are as follows:

- A survey could be mailed to each of the agency's clients.
- Each client could be sent an e-mail with a survey attached.
- The next time one of the firms agents meets with a client they could conduct a personal interview to obtain the data.

23. a. The population is American teens aged 13–17 who own a smartphone.

b. The population is American teens aged 13–17 who do not own a smartphone.

c. Pew Research conducted a sample survey. It would not be practical to conduct a census because it would take too much time and money to do so.

24. a. This is a statistically correct descriptive statistic for the sample.

b. An incorrect generalization because the data were not collected for the entire population.

c. An acceptable statistical inference based on the use of the word *estimate*.

d. Although this statement is true for the sample, it is not a justifiable conclusion for the entire population.

e. This statement is not statistically supportable. Although it is true for the particular sample observed, it is entirely possible and even highly likely that at least some students will be outside the 65 to 90 range of grades.

25. a. There are five variables: Overall Score, Recommended, Owner Satisfaction, Overall Miles Per Gallon, and Acceleration (0–60) Sec.

b. Categorical variables: Recommended, Owner Satisfaction

Quantitative variables: Overall Score, Overall Miles Per Gallon, Acceleration (0–60) Sec

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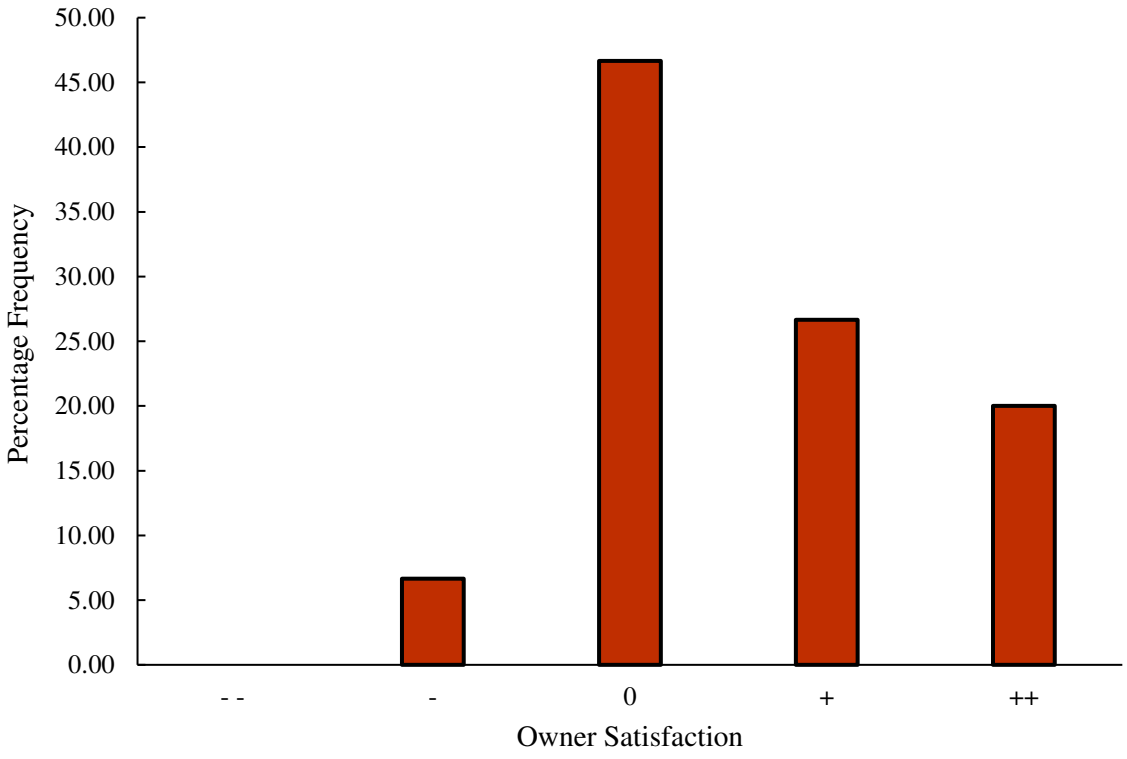
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c. 7/15 or 47% are recommended

d. 24.4 miles per gallon

e.

Response	Percentage
– –	0.00
–	6.67
0	46.67
+	26.67
++	20.00

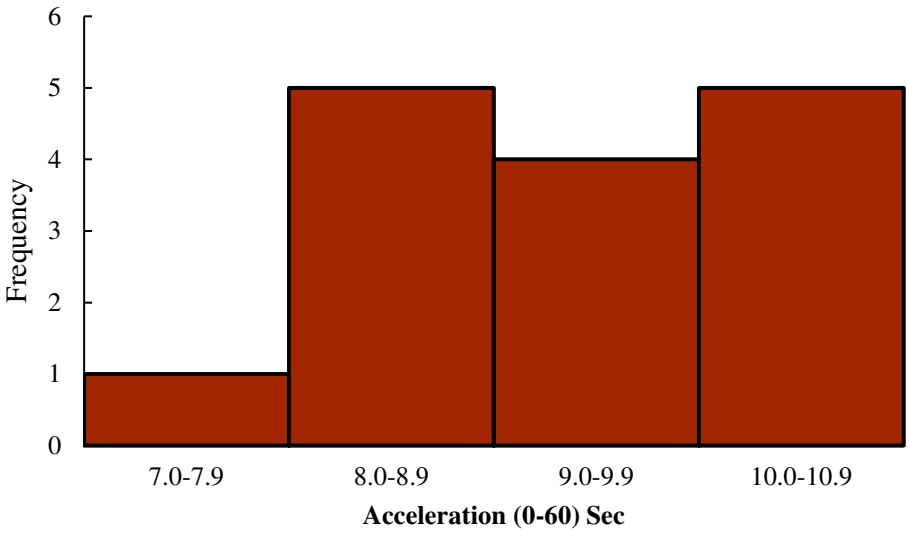


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f.

Acceleration (0–60) Sec	Frequency
7.0–7.9	1
8.0–8.9	5
9.0–9.9	4
10.0–10.9	5



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