CHAPTER 1

1.1   The type of beverage sold is an example of categorical variable because the type has values that can only be placed into categories.

1.2   Three sizes of soft drink are classified into distinct categories—small, medium, and large—and, hence, is an example of categorical variable.

1.3   The download time is a continuous variable because the response takes on any value within a continuum, or an interval, depending on the precision of the measuring instrument.

1.4   (a)   The number of landline telephones is a numerical variable that is discrete because the outcome is a count.
       (b)   The length of the longest telephone call is a numerical variable that is continuous because any value within a range of values can occur.
       (c)   Whether someone in the household owns a Wi-Fi–capable cell phone is a categorical variable because the answer can be only yes or no.
       (d)   Same answer as in (c).
       (e)   Same answer as (c).
       (f)   Same answer as (a).

1.5   (a)   numerical, continuous
       (b)   numerical, discrete
       (c)   categorical
       (d)   categorical

1.6   (a)   categorical
       (b)   numerical, continuous
       (c)   numerical, discrete
       (d)   numerical, discrete
       (e)   categorical

1.7   (a)   numerical, continuous *
       (b)   categorical
       (c)   categorical
       (d)   numerical, discrete
         *Some researchers consider money as a discrete numerical variable because it can be "counted."

1.8   (a)   numerical, continuous *
       (b)   numerical, discrete
       (c)   numerical, continuous *
       (d)   categorical
         *Some researchers consider money as a discrete numerical variable because it can be "counted."

1.9   (a)   Income may be considered discrete if we "count" our money. It may be considered
                continuous if we "measure" our money; we are only limited by the way a country's
                monetary system treats its currency.
        (b)   The first format is preferred because the responses represent data measured on a
                higher scale.

1.10   The underlying variable, ability of the students, may be continuous, but the measuring
        device, the test, does not have enough precision to distinguish between the two students.

1.11   (a)   The population is "all working women from the metropolitan area." A systematic or
                random sample could be taken of women from the metropolitan area. The director
                might wish to collect both numerical and categorical data.
        (b)   Three categorical questions might be occupation, marital status, type of clothing.
                Numerical questions might be age, average monthly hours shopping for clothing,
                income.

1.12   A population contains all the items of interest whereas a sample contains only a portion of
        the items in the population.

1.13   A statistic is a summary measure describing a sample whereas a parameter is a summary
        measure describing an entire population.

1.14   Descriptive statistical methods deal with the collection, presentation, summarization, and
        analysis of data whereas inferential statistical methods deal with decisions arising from the
        projection of sample information to the characteristics of a population.

1.15   Categorical variables yield categorical responses, such as yes or no answers. Numerical
        random yield numerical responses, such as, your height in inches.

1.16   Discrete variables produce numerical responses that arise from a counting process.
        Continuous variables produce numerical responses that arise from a measuring process.

1.17   An operational definition is a universally accepted meaning that is clear to all associated
        with an analysis. Without an operational definition, confusion can occur.

1.18   Data are the values associated with a trait or property that help distinguish the occurrences of
        something while a variable is one of those traits or properties that helps distinguish the
        occurrence of something. A variable describes a characteristic of an item or individual while
        data are the set of individual values associated with a variable.

Answers for 1.19 through 1.25 provided below are just some of the many different possible answers.

1.19   Microsoft Excel or Minitab could be used to perform various statistical computations that
        were possible only with a slide-rule or hand-held calculator in the old days.

1.20   (a)   The population of interest was all the fulltime first-year students at the Midwestern United States university when the survey was conducted.
       (b)   The sample that was collected consisted of those 2821 students who responded to the survey.
       (c)   An example of a parameter of interest could be the proportion in the population of all the fulltime first-year students at this Midwestern United States university who had studied with other students.
       (d)   The statistic that could be used to estimate the parameter in (c) was the 90.1% of students in the sample who indicated that they had studied with other students.

1.21   The answers to this question vary day-to-day according to the top analyses of a particular day.

1.22   (a)   The population of interest was all adults living in the United States, aged 18 and older.
       (b)   The sample was the 1,000 or more adults living in the United States, aged 18 and older that responded to the telephone interviews.
       (c)   The 74% is a statistic.
       (d)   The 40% is a statistic.

1.23   The answers to this question depend on which data set is being selected.

1.24   (a)   The answer to "In 2007, did another company or organization own more than 50% of this business?" is an example of a categorical variable.
       (b)   The "percentage owned" is an example of numerical variable.

1.25   (a)   The population of interest was the 2100 business students at Northern Kentucky University when the study was conducted.
       (b)   The sample consisted of the 96 students that were involved in the study.
       (c)   class: categorical; age: numerical; gender: categorical; major: categorical
       (d)   class: ordinal; age: ratio; gender: nominal; major: nominal.

1.26   (a)   (i)   categorical   (iii) numerical, discrete
             (ii)   categorical   (iv) categorical
       (b)   The answers will vary.
       (c)   The answers will vary.

1.27   (a)   Categorical variables: gender, class, major, grad intention, employment status, computer.
       (b)   Numerical variables: age, GPA, expected salary, social networking, satisfaction, spending, text messages and wealth.
       (c)   Discrete numerical variables: age (in years), expected salary (in thousands of dollars), social networking (in number), satisfaction (from 1 to 7), spending (in dollars), text messages (in number) and wealth.

1.28   (a)   Categorical variables: gender, graduate major, undergrad major, and employment status.
       (b)   Numerical variables: age, graduate GPA, undergrad GPA, number of full-time jobs, expected salary, spending, advisory rating, the number of text messages sent and wealth.
       (c)   Discrete numerical variables: age (in years), number of jobs, expected salary (in thousands of dollars), spending (in dollars), advisory rating (from 1 to 7), the number of text messages sent and wealth.