**CHAPTER 1—An Introduction to Business Statistics**

**1.1** Any characteristic of a population unit is called a variable.   
Quantitative: values on the real number line.  
Qualitative: record unit into categories.

L01-01, L01-02

**1.2 a.** Quantitative; dollar amounts correspond to values on the real number line.

**b.** Quantitative; net profit is a dollar amount.

**c.** Qualitative; which stock exchange is a category.

**d.** Quantitative; national debt is a dollar amount.

**e.** Qualitative; media is categorized into radio, television, or print.

L01-02

**1.3** Cross sectional data are collected at approximately the same point in time whereas time series data are collected over different time periods.

The total number of cars sold in 2009 by 10 different sales people are cross sectional data.

The total number of cars sold by a particular sales person for the years 2005 – 2009 are time series data.

L01-03

**1.4** The response variable is whether or not the person has cancer. The factors or independent variables are age, sex, occupation, and number of cigarettes smoked per day. This is an observational study.

L01-05

**1.5** $398,000

L01-01

**1.6** Diamond: Lake Lot $494,000

Rudy: Lake Lot $447,000

L01-01

**1.7**

This chart shows sales are increasing over time.

L01-04

**1.8** A population is a set of existing units.  
Consumers utilizing a particular product.

L01-06

**1.9** Census: examine all of the population units.  
Sample: subset of the units in a population.

L01-06

**1.10** Descriptive statistics: science of describing the important aspects of a set of measurements.

Statistical inference: science of using a sample of measurements to make generalizations about the important aspects of a population of measurements.

L01-07

**1.11** A process is a series of operations that take input(s) and generate output(s).

L01-06

**1.12** Most of the scores would fall between 36 and 48 because 36 is the smallest score in the sample and 48 is the largest score in the sample. An estimate of the proportion of scores that would be at least 42 is 46/65 = 0.708 because 46 of the 65 sample scores are at least 42.

L01-08

**1.13** Most waiting times will be from 0.4 to 11.6 minutes. An estimate of the proportion of waiting times less than 6 minutes is found by counting the number of customers with waiting times

less than 6 minutes and dividing by the total of 100 customers. 

L01-08

**1.14** Most breaking strengths will be between 46.8 lbs and 54 lbs.

L01-08

**1.15** A ratio variable is a quantitative variable measured on a scale such that ratios of values of the variables are meaningful and there is an inherently defined zero value. An interval variable is a quantitative variable such that ratios of values of the variable are not meaningful and there is not an inherently defined zero value.

L01-09

**1.16** An ordinal variable is a qualitative variable such that there is a meaningful ordering, or ranking, of the categories. A nominative variable is a qualitative variable such that there is no meaningful ordering, or ranking, of the categories.

L01-09

**1.17** Ordinal, nominative, ordinal, nominative, ordinal, and nominative.

L01-09

**1.18** Nominative, ordinal, ordinal, ordinal, nominative, and nominative.

L01-09

**1.19**

Basing the limits on the minimum and maximum temperatures observed, the lower limit is 146 degrees and the upper limit is 173 degrees.

L01-04, L01-08

**1.20** The process is not in statistical control and the higher percentages of people waiting too long occur early in the week. A potential solution is to staff at a higher level early in the week.

L01-04