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

# §1.1, 1.2 Concepts

**1.1** Any characteristic of a population element is called a variable.
Quantitative: we record numeric measurements that represent quantities.
Qualitative: we record which of several categories the element falls into.

LO01-01, LO01-02

**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; which type of media is a category.

LO01-02

**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 2012 by 10 different sales people are cross sectional data.

 The total number of cars sold by a particular sales person for the years 2008-2012 is characterized as time series data.

LO01-03

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

LO01-05

# §1.1, 1.2 Methods and Applications

**1.5** $398,000 for a Ruby model on a Treed Lot

LO01-01

**1.6** $494,000 for a Diamond model on a Lake Lot

 $447,000 for a Ruby model on a Lake Lot

LO01-01

**1.7**

This chart shows that sales are increasing over time.

LO01-04

# §1.3, 1.4 Concepts

**1.8** A *population* is the set of all elements about which we wish to draw conclusions.
For example: Consumers who buy a particular product.

LO01-06

**1.9** A *census* is the examination all of the population measurements.
A sample is a subset of the elements in a population.

LO01-06

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

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

LO01-07

**1.11** A *process* is a sequence of operations that takes input(s) and generates output(s).

LO01-06

# §1.3, 1.4 Methods and Applications

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

LO01-08

**1.13** We estimate that most waiting times will be from 0.4 to 11.6 minutes because 0.4 is the smallest time in the sample and 11.6 is the largest. 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: 60/100 = 0.6.

LO01-08

**1.14** We estimate that most breaking strengths will be between 46.8 lbs and 54 lbs, the smallest and largest observed values.

LO01-08

# §1.5 Concepts

**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.

LO01-09

**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.

LO01-09

# §1.5 Methods and Applications

**1.17** Letter Grades: Ordinal
Door Choices: Nominative
TV Classifications: Ordinal
PC Ownership: Nominative
Restaurant Ratings: Ordinal
Filing Status: Nominative.

LO01-09

**1.18** PC OS: Nominative
Movie Classifications: Ordinal
Education Level: Ordinal
Football Rankings: Ordinal
Stock Exchanges: Nominative
Zip Codes: Nominative.

LO01-09

# Supplementary Exercises

**1.19**

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

LO01-04, LO01-08

**1.20** The Time Series Plot shows that, the earlier in the week, the higher the percentage of people who wait longer than one minute to be seated. A potential solution is to staff at a higher level early in the week.

LO01-04

# Internet Exercise

**1.21** Analyses will vary.