

DEFINITIONS

Data are collections of observations, such as measurements, genders, or survey responses. (A single data value is called a *datum*, a term that does not see very much use.)

Statistics is the science of planning studies and experiments; obtaining data; and then organizing, summarizing, presenting, analyzing, and interpreting those data and then drawing conclusions based on them.

A **population** is the complete collection of *all* measurements or data that are being considered.

A **census** is the collection of data from *every* member of the population.

A **sample** is a *subcollection* of members selected from a population.

Because populations are often very large, a common objective of the use of statistics is to obtain data from a sample and then use those data to form a conclusion about the population. See Example 1.

Example 1 Gallup Poll: Identity Theft

In a poll conducted by the Gallup corporation, 1013 adults in the United States were randomly selected and surveyed about identity theft. Results showed that 66% of the respondents worried about identity theft frequently or occasionally.

Gallup pollsters decided who would be asked to participate in the survey and they used a sound method of randomly selecting adults. The respondents are not a voluntary response sample, and the results are likely to be better than those obtained from the America OnLine survey discussed earlier.

In this case, the population consists of all 241,472,385 adults in the United States, and it is not practical to survey each of them. The sample consists of the 1013 adults who were surveyed. The objective is to use the sample data as a basis for drawing a conclusion about the population of all adults, and methods of statistics are helpful in drawing such conclusions.

Origin of "Statistics"

The word *statistics* is derived from the Latin word *status* (meaning "state"). Early uses of statistics involved compilations of data and graphs describing various aspects of a state or country. In



1662, John Graunt published statistical information about births and deaths. Graunt's work was followed by studies of mortality and disease rates, population sizes, incomes, and unemployment rates. Households, governments, and businesses rely heavily on statistical data for guidance. For example, unemployment rates, inflation rates, consumer indexes, and birth and death rates are carefully compiled on a regular basis, and the resulting data are used by business leaders to make decisions affecting future hiring, production levels, and expansion into new markets.

**1-2 Statistical and Critical Thinking**

Key Concept This section provides an overview of the process involved in conducting a statistical study. This process consists of "prepare, analyze, and conclude." We begin with a preparation that involves consideration of the context, consideration of the source of data, and consideration of the sampling method. Next, we construct suitable graphs, explore the data, and execute computations required for the statistical method being used. Finally, we form conclusions by determining whether results have statistical significance and practical significance. See Figure 1-2 for a summary of this process.

Figure 1-2 includes key elements in a statistical study. Note that the procedure outlined in Figure 1-2 does not focus on mathematical calculations. Thanks to wonderful developments in technology, we now have tools that effectively do the number crunching so that we can focus on understanding and interpreting results.