Chapter 1: Introduction to Statistics

Section 1.1: Getting Started

Statistics is:

OR

Statistics are:

A **population** is:

Variables are:

Data are:

A **census** is:

A **parameter** is:

A **sample** is:

Sample statistics are:

Table 1.1.1: Population vs. Sample

Population   Sample

Example 1.1.1: Identifying Population and Sample

Identify the population and the sample.

   a. In a survey, 359 college students at the University of Jackson were asked if they had tried the October flavor of the month at the campus coffee shop. Eighty-three of the students surveyed said yes.

      Population:

      Sample:

   b. A survey of 1125 households in the United States found that 19% listen to satellite radio.

      Population:

      Sample:

Example 1.1.2: Identifying Population, Sample, Parameters, and Statistics

Read each of the shortened survey reports on page 6 of Learn.

   I. Population:

      Sample:

      Parameter or Statistic:

  II. Population:

      Sample:

      Parameter or Statistic:

<u>Branches of Statistics</u>

Descriptive Statistics:

Inferential Statistics:

Example 1.1.3: Identifying Descriptive and Inferential Statistics

In a news report on the state of the media by Tom Rosenstiel and Amy Mitchell, they write the following:

"AOL had 900 journalists, 500 of them at its local Patch news operation.... By the end of 2011, Bloomberg expects to have 150 journalists and analysts for its new Washington operation, Bloomberg Government."

Source: Rosenstiel, Tom, and Amy Mitchell. "Overview." *The State of the News Media: An Annual Report on American Journalism.* Pew Research Center's Project for Excellence in Journalism. 2011. http://stateofthemedia.org/2011/overview-2/ (12 Dec. 2011).

Identify the descriptive and inferential statistics used in this excerpt from their article.

Descriptive:

Inferential:

Section 1.2: Data Classification

Qualitative data consists of:

Quantitative data consists of:

Example 1.2.1: Classifying Data as Qualitative or Quantitative

Classify the following data as either qualitative or quantitative.

    a. Shades of red paint in a home improvement store

    b. Rankings of the most popular paint colors for the season

    c. Amount of red primary dye necessary to make one gallon of each shade of red paint

    d. Numbers of paint choices available at several stores

Continuous vs. Discrete Data

Continuous data are:

Discrete data are:

Example 1.2.2: Classifying Data as Continuous or Discrete

Determine whether the following data are continuous or discrete.

    a. Temperatures in Fahrenheit of cities in South Carolina

    b. Numbers of houses in various neighborhoods in a city

    c. Numbers of elliptical machines in every YMCA in your state

    d. Heights of doors

Levels of Measurement

Data at the **nominal level** of measurement are:

Example 1.2.3: Understanding the Nominal Level of Measurement

    a. Suppose all students in a statistics class were asked what pizza topping is their favorite. Explain why these data are at the nominal level of measurement.

    b. Suppose instead that you wish to know the number of students whose favorite pizza topping is sausage. Explain why this data value is not at the nominal level of measurement.

Data at the **ordinal level** of measurement are:

Example 1.2.4: Classifying Data as Nominal or Ordinal

Determine whether the data are nominal or ordinal.

    a. The seat numbers on your concert tickets, such as A23 and A24.

    b. The genres of the music performed at the original Grammys in 1959.

Data at the **interval level** of measurement are:

Example 1.2.5: Classifying Data by the Level of Measurement

The birth years of your classmates are collected. What level of measurement are these data?

Data at the **ratio level** of measurement are:

Example 1.2.6: Classifying Data by the Level of Measurement

Consider the ages in whole years of US presidents when they were inaugurated. What level of measurement are these data?

Example 1.2.7: Classifying Data

Determine the following classifications for the given data sets: qualitative or quantitative; discrete, continuous, or neither; and level of measurement.

    a. Finishing times for runners in the Labor Day 10 K race

    b. Colors contained in a box of crayons

    c. Boiling points (on the Celsius scale) for various caramel candies

    d. The top ten Spring Break destinations as ranked by USA Today

Section 1.3: The Process of a Statistical Study

Procedure: Conducting a Statistical Study

1.

    a.

    b.

    c.

2.

3.

4.

Example 1.3.1: Identifying Population and Variables

Neurologists want to study the effect of vitamin C on nerve disorders. The goal of the study is to see if taking an intravenous dose of vitamin C will reduce the amount of nerve pain reported by patients. Identify the population of interest and the variables in this study.

An **observational study**:

An **experiment**:

Example 1.3.2: Identifying Observational Studies and Experiments

Which type of study would you conduct: an observational study or an experiment?

   a. You want to determine the average age of college students across the nation.

   b. Researchers wish to determine if flu shots actually help prevent severe cases of the flu.

<u>Observational Studies</u>

A **representative sample**:

A **random sample** is:

In a **simple random sample**:

A **stratified sample** is:

A **cluster sample** is:

A **systematic sample** is:

A **convenience sample** is:

Example 1.3.3: Identifying Sampling Methods

Identify the type of sampling used in each of the following scenarios.

   a. A pollster surveys 50 people in each of a senator's 12 voting precincts.

   b. The quality control department at a cereal manufacturer measures the weight of every 10th box off of the assembly line.

   c. A student walks down the halls in her dorm asking students how much money they would spend in a food court in the dorm lobby in an effort to persuade the administration to offer such an option.

   d. An educator chooses 5 of the school districts in the Chicago area and asks each household in those districts how many school-age children are in the home.

   e. To determine who will win a $100,000 shopping spree at the mall, the manager draws a name out of a box of entries.

Types of Observational Studies

A **cross-sectional study** is:

In a **longitudinal study**:

Example 1.3.4: Classifying Studies as Cross-Sectional or Longitudinal

Categorize the following studies as either cross-sectional or longitudinal.

a. A group of 220 patients is followed for 15 years in order to determine the long-term health effects resulting from gastric bypass surgery.

b. A gastroenterologist surveys 130 of his patients six months after having gastric bypass surgery to determine the average amount of weight lost.

A **meta-analysis**:

A **case study**:

Example 1.3.5: Classifying Studies as Meta-Analysis or Case Study

Categorize the following studies as either a meta-analysis or a case study.

a. Oceanographers study research on tsunamis dating from 1900 to 2000 to determine their effects on the ocean floor.

b. Meteorologists study the Indian Ocean tsunami of December 2004 to try to identify warning signs.

<u>Experiments</u>

A **treatment** is:

Subjects are:

Participants are:

The **response variable** is:

The **explanatory variable** is:

Procedure: Principles of Experimental Design

1.

2.

3.

The **treatment group** is:

The **control group**:

Confounding variables are:

The **placebo effect**:

Placebo:

In a **single-blind** experiment:

In a **double-blind** experiment:

Example 1.3.6: Identifying Parts of an Experiment

Read the scenario of page 21 of Learn.

a. Identify the explanatory and response variables.

b. What is the treatment?

c. Which group is the treatment group and which group is the control group?

d. What is the purpose of administering saline to Group B?

e. Is this a single-blind or double-blind study? Do you think this is the best choice for this study?

Institutional Review Boards

An **Institutional Review Board** is:

Informed consent involves: