4.1 Sampling and Surveys

**Population and Sample**

The **population** in a statistical study is the entire group of individuals about which we want information.

A **sample** is the part of the population from which we actually collect information. We use information from a sample to draw conclusions about the entire population.

**The Idea of a Sample Survey**

**Step 1:** Define the *population* we want to describe.

**Step 2:** Say exactly *what we want to measure.*

A “sample survey” is a study that uses an organized plan to choose a sample that represents some specific population.

**Step 3:** Decide how to choose a sample from the population.

**How to Sample Badly**

The design of a statistical study shows **bias** if it systematically favors certain outcomes.

Choosing individuals who are easiest to reach results in a **convenience sample.**

Why are convenience samples normally biased?

A **voluntary response sample** consists of people who choose themselves by responding to a general appeal.

Why are voluntary response samples normally biased?

**How to Sample Well: Random Sampling**

**Random sampling**, the use of chance to select a sample, is the central principle of statistical sampling.

A **simple random sample (SRS)** of size *n* consists of n individuals from the population chosen in such a way that every set of *n* individuals has an equal chance to be the sample actually selected.

**How to Choose an SRS**

A table of random digits is a long string of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 with these properties:

Each entry in the table is equally likely to be any of the 10 digits 0 - 9.

The entries are independent of each other. That is, knowledge of one part of the table gives no information about any other part.

**How to Choose an SRS Using Table D**

Step 1: Label. Give each member of the population a numerical label of the *same length.*

Step 2: Table. Read consecutive groups of digits of the appropriate length from Table D.

Your sample contains the individuals whose labels you find.

Example:

Problem: Use Table D at line 130 to choose an SRS of 4 hotels.

01 Aloha Kai 08 Captiva 15 Palm Tree 22 Sea Shell

02 Anchor Down 09 Casa del Mar 16 Radisson 23 Silver Beach

03 Banana Bay 10 Coconuts 17 Ramada 24 Sunset Beach

04 Banyan Tree 11 Diplomat 18 Sandpiper 25 Tradewinds

05 Beach Castle 12 Holiday Inn 19 Sea Castle 26 Tropical Breeze

06 Best Western 13 Lime Tree 20 Sea Club 27 Tropical Shores

07 Cabana 14 Outrigger 21 Sea Grape 28 Veranda

Example 2:

Problem: Use Table D at line 108 to choose an SRS of 2 students.

Juan Vanessa Diana Matt Lucia Ana Jennifer Max

Example 3:

Problem: Use Table D at line 115 to choose an SRS of 10 seniors from the senior class of 400 students. Assume the students are assigned numbers of 1-400.