Inferential Statistics:

- **Statistical Inference** – the process of drawing conclusions about the nature of a population based on data from a sample.
- **Study** – observing individuals and measuring variables of interest.
- **Experiment** – deliberately imposing some treatment on individuals in order to observe their responses.
Census:

• An attempt to contact every individual in the entire population to collect information about that population.

• A population is an entire group of individuals that we want information about.
Sampling:

- **Sample** – the part of the population we actually examine in order to gather information.
- Sampling allows us to study a portion to get information about an entirety.
- A sample must represent the population as much as possible so results/conclusions will generalize.
- Thus, sampling techniques and methods must be chosen and executed properly.
Example

- **Population**: All parents of CRHS students.
- **Sample**: Parents who attend Open House.
Sampling Design

- The method used for choosing the sample.
- Your method for choosing a sample must be defensible.
Bias in a sample:

- **Bias** – systematically favoring certain outcomes.
- When a sample is biased, it “misses the mark” because some parts of the population are favored over others. Not all the subjects have the same chance of being picked.
- Voluntary Response Sampling and Convenience Sampling (which follow) are both biased.
Voluntary Response Sample:

- People choose themselves by responding to a general appeal.
- Source of Bias: Persons with strong opinions are over-represented.
Convenience Sample:

- People who are easiest to reach are chosen. These include mall shoppers/pollsters.
- Source of Bias: Convenience samples miss getting a good cross-section of subjects (undercoverage).
*Note:*

- There is always error in sampling.
- Sampling errors cannot be avoided.
- Three categories of sampling errors:
  - Random Sampling Error – chance variation.
  - Sampling Method Error – error that occurs because of the choice of a sampling method.
  - Non-sampling Error – error occurs in the responses by individuals in the sample.
Probability Sampling

- Any method of sampling that utilizes some form of random selection. This is the general framework for all defensible sampling.
- The idea (in almost every case) is to give each individual in the population the same chance (greater than zero) of being selected.
- The following methods are all types of probability sampling.
Simple Random Sampling (SRS)

- The sample is chosen in such a way that every set of “n” individuals has an equal chance of being selected.
- This may be accomplished using technology, or using a Random Number (Digit) Table.
Random Digit Table

- Table B in the back of the textbook.
- Uses long strings of digits from 0 – 9 where each entry is equally likely and the entries are independent of each other.
Independence

- Knowledge of one outcome gives no information about the next outcome.
Sampling Frame

- The list of individuals from which a sample is actually selected.
Steps for using a Random Digit Table:

- Assign a numerical label of equal length to each member of the group.
- Use table B to select labels at random.
- Since the table has no order, you may start at any row and proceed in any systematic fashion.
Homework

- Textbook 5.1, 5.2, 5.7, 5.8, 5.10