Statistical Thinking

The field of statistics deals with the collection, presentation, analysis, and use of the sampled data to make inferences of the population to

- Make decisions

- Solve problems

- Design products and processes

Probability and Probability Models

• **Probability models** make conclusions about a sample based on knowledge of the population, help quantify the risks involved in statistical inference, that is, risks involved in decisions made every day.

• Probability provides the **framework** for the study and application of statistics.

Overview

- ▶ Identify a population of interest
  —-for example, UNM freshmen female students' weight, height or entrance GPA.

- ▶ Population parameters
  —-unknown quantities of the population that are of interest, say, population mean μ and population variance σ^2 etc.

- ▶ Random sample
  —-Select a random or representative sample from the population.
  —-A sample consists random variables $Y_1, \cdots, Y_n$, that follows a specified distribution, say $N(\mu, \sigma^2)$

- ▶ Statistic: a function of radom variables $Y_1, \ldots, Y_n$, which does not depend on any unknown parameters

- ▶ Observed sample: $y_1, y_2, \cdots, y_n$ are observed sample values after data collection

▶ We cannot see much of the population
—–but would like to know what is typical in the population
— The only information we have is that in the sample.

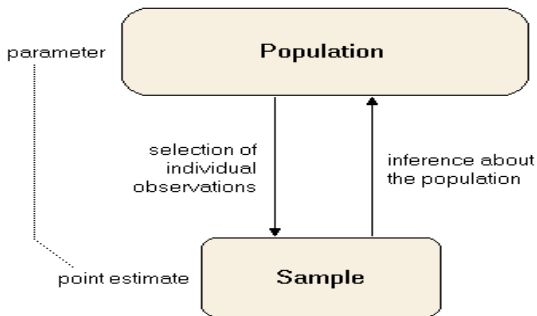**Goal**: want to use the sample information to make inferences about the population and its parameters.

Figure 1 : Population, sample and statistical inference