# Introductory Statistics – Neil Weiss

## Statistics Basics

### Terms

**Population**: The collection of all individuals or items under consideration in a statistical study

**Sample**: That part of the population from which information is obtained

**Descriptive Statistics**: Consists of methods for organizing and summarizing information. Descriptive statistics includes the construction of graphs, charts, and tables and the calculation of various descriptive measures such as averages, measures of variation, and percentiles.

**Inferential Statistics**:Consists of methods for drawing and measuring the reliability of conclusions about a population based on information obtained from a sample of the population.

**Observational Study**: In an observational study, researchers simply observe characteristics and take measurements, as in a sample survey. An observational study can employ either descriptive or inferential statistics, depending on its objectives.

**Designed Experiment**: In a designed experiment, researchers impose treatments and controls and then observe characteristics and take measurements. A designed experiment is typically aimed at using inferential statistics to draw conclusions that extend beyond the immediate data collected

**Descriptive & Inferential Statistics Interrelation**

* Descriptive statistics and inferential statistics are interrelated. You must almost always use techniques of descriptive statistics to organize and summarize the information obtained from a sample before carrying out an inferential analysis.
* Preliminary descriptive analysis of a sample often reveals features that lead you to the choice of (or to a reconsideration of the choice of) the appropriate inferential method.

**Differentiating Between Descriptive & Inferential Statistics**

* To determine whether a set of statistical data is descriptive or inferential, you can consider the purpose and scope of the analysis being performed.
* **Descriptive Statistics:** If the data is summarizing characteristics of an entire dataset without drawing conclusions or making generalizations beyond that dataset, then it is likely descriptive. Typical descriptive statistics include mean, median, standard deviation, and frequency distributions. These statistics simply describe the data at hand.
* **Inferential Statistics:** If the data is being used to make predictions, estimates, or generalizations about a population based on a sample, then it is likely inferential. Inferential statistics often involve hypothesis testing, confidence intervals, and regression analysis. These statistics allow you to infer trends or characteristics about a larger population from the sample data.
* In summary, the easiest way to identify the type of statistics is to look at whether the data is being used merely to describe a dataset or to make inferences about a larger population.