

Start : Read Chapter 1

01/18/2023

Homework # 0 due Monday at noon

Homework # 1 due next Friday at noon

## Chapter 1 - Intro to Statistics

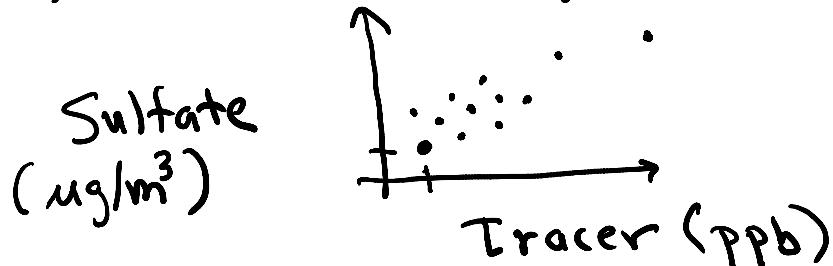
→ Statistics : Scientific discipline that provides methods to help make sense of data.

1. Conducting studies and collecting data.
2. Summarizing and describing data in order extract maximum information.
3. Drawing conclusions and making decisions based on data.

Examples (see Website)

i.) Effect of vaccine on COVID-19

(ii.) Air pollution at the Grand Canyon



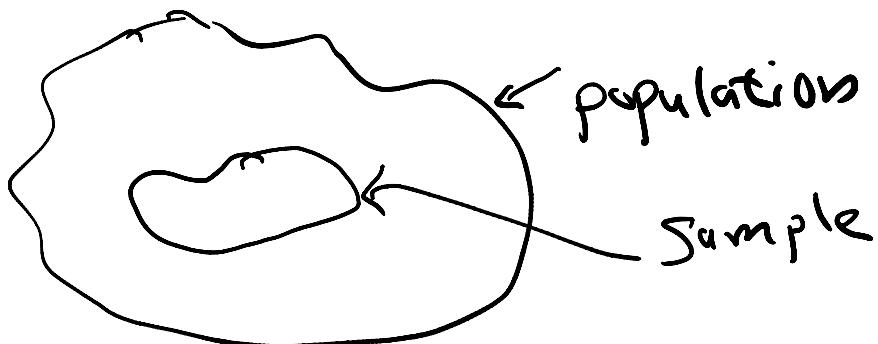
(iii) Car reliability study

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#### key concepts

Population: Entire set of measurements (or responses) about which information is desired.

Sample: Subset of measurements (or responses) selected from the population.

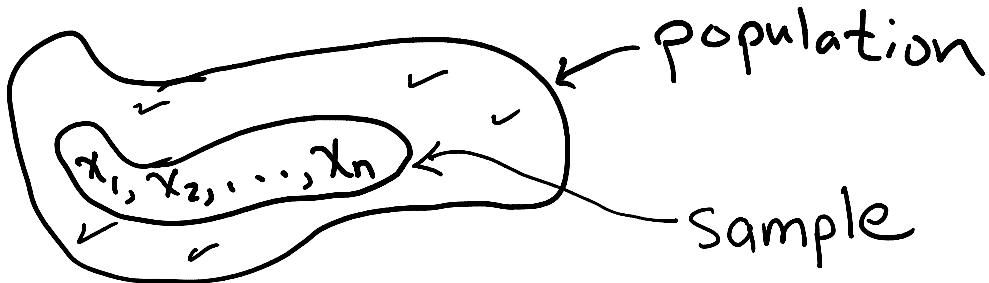


1. Observational Study, Designed experiment (experimental study)
2. Descriptive Statistics
3. Inferential Statistics

Def : A variable is a characteristic whose value may change from one object to another in a population

Ex :  $x$  = height of ponderosa pine tree.

Ex :  $\chi$  = height of ponderosa pine tree.  
 $n$  = sample size  
= 30



$$\sum_{i=1}^n x_i = x_1 + x_2 + \dots + x_n$$

The goal of Statistics is to make decisions and draw conclusions about characteristics of the population based on  $x_1, x_2, \dots, x_n$ .

### Observational Study :

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The investigator collects the measurements and the notes whether or not the measurements are related to differences in conditions.

These studies may suggest an association between different variables.

However, extraneous factors are not controlled.

## Experimental Study:

The investigator controls conditions under which measurements are taken so that all extraneous factors are dealt with by randomization.

Designed experiments can be used to show causal inferences.

## Types of Data

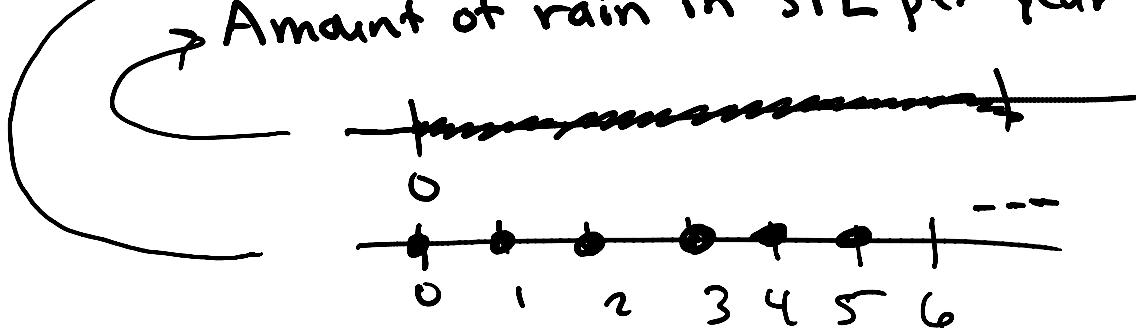
- 1. Categorical data
  - nominal
  - ordinal
- 2. Numerical data
  - discrete
  - continuous

Ex: Hair color

Letter grade

Number of siblings

Amount of rain in STL per year



~ 1 2 3 4 5 6

Def: Discrete variables take on distinct values with gaps between possible values.

Continuous variables take on any value in an interval on a number line with no gaps between possible values.

(NOTE: Chapter 1 notes will be posted in canvas)