1A What Is Stats?

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1A What is Statistics?

[ToC]

A.1 Statistics is the discipline of data

- Statistics is the discipline that concerns the collection, organization, analysis, interpretation and presentation of data.

- Statistics is not a subcategory of Math. It just uses Math. Engineers also use Math, but that doesn't make Engineering subcategory of Math.

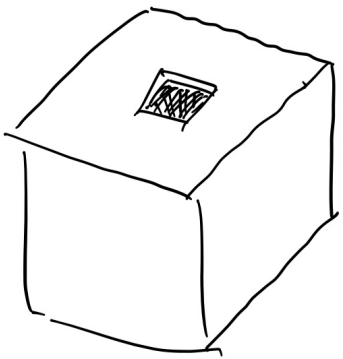
- Probability Theory is a subcategory of Math.

A.2 Descriptive and Inferential Statistics

- **Descriptive Statistics:** Summarize and describe important feasure of the data.
  - Ch1 (only)
- **Probability Theory**
  - Ch 2,3,4
- **Inferential Statistics:** Tries to generalizes the information gained from a **sample** to a **population**.
  - Ch5,6,7,8
  - Parameter estimation, Prediction

Inferential Statistics uses **Probability Theory** backwards.

A.3 Descriptive and Inferential Statistics

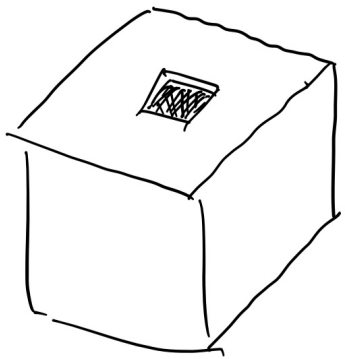


A.4 Population, Sample, and SRS

- **Population:** The body of interest.
- **Sample:** A subset of population chosen in some "ramdom" manner.
- **Data:** Collection of facts, numbers, and measurements.

We collect **Sapmple** to infer about **Population**.

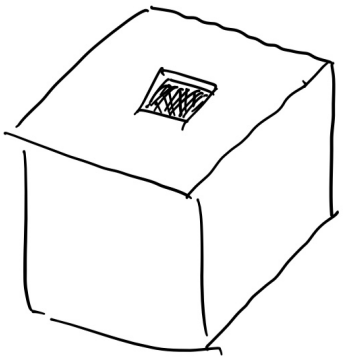
A.5 Probability Theory



A.6 Ex 1.8 Concrete filled H-beam

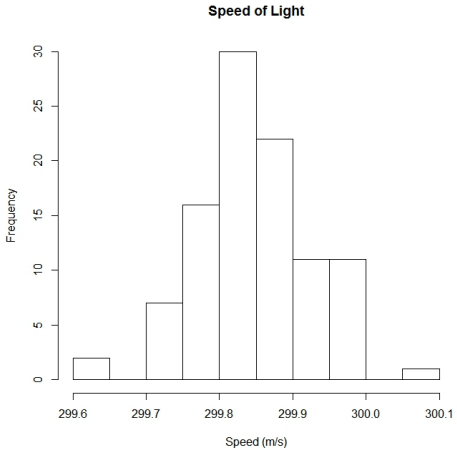
An article reported the results of cyclic loading tests on concrete filled tubular (CFT) column to H-beam welded connections. 75 test specimens were loaded until failure. Some failures occurred at the welded joint; others occurred through buckling in the beam itself. For each specimen, the location of the failure was recorded, along with the torque applied at failure in kilonewton-meters. The results for the first five specimens were as follows:

Specimen	*Torque* $(kN \cdot m)$	*Failure Location*
1	165	*Weld*
2	237	*Beam*
3	222	*Beam*
4	255	*Beam*
5	194	*Weld*
⋮	⋮	⋮



A.7 Ex 1.2 Rolls of Wallpaper

A quality engineer at a factory that produces rolls of wallpaper wants to ensure each day, that the percentage of rolls with flaws in the printing is less than 9%. She decides to draw a sample of 100 rolls of wallpaper from a day's production. Within the sample, 7 rolls are found to have flaws in the printing.


Speed of Light
Frequency
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5
10
15
20
25
30
299.6
299.7
299.8
299.9
300.0
300.1
Speed (m/s)