



# Introductory Statistics

Descriptive Statistics

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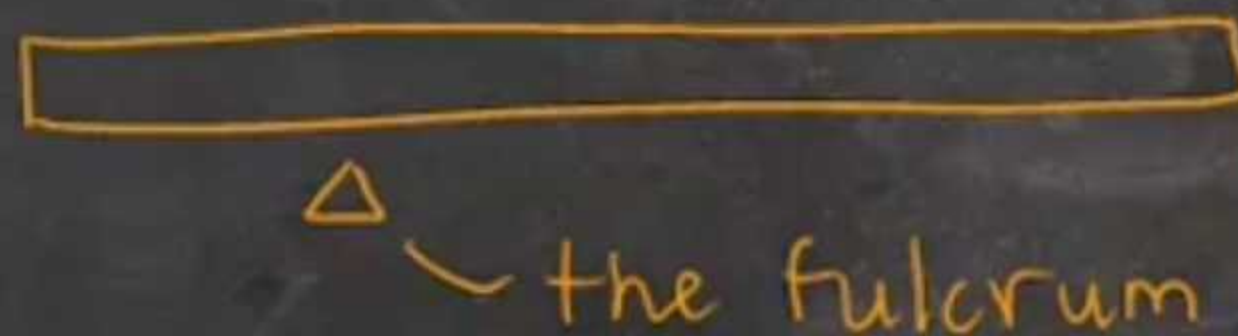




## Introductory Statistics Measures of Center

What is the difference between a mean and a median?

- **Median:** The middle value when the observations are ordered from the smallest to the largest. 
- **Mean:** The 'balance point' of the data. Found by summing all of the observations and dividing by the number of observations.







# Introductory Statistics

## Measuring Variation

How do you express variation of raw data around a mean?





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## Measures of Spread:

### Variance and Standard Deviation

#### Sample Variance:

a measure similar to the average of the squared deviations

$$s^2 = \frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-1}$$

the squared deviation of observations from the mean divided by  $n-1$

computational formula

$$= \frac{\sum_{i=1}^n y_i^2 - \frac{\left(\sum_{i=1}^n y_i\right)^2}{n}}{n-1}$$

divide by  $n-1$  because if we know the mean and  $n-1$  observations, then we can find the  $n^{\text{th}}$  observation

#### Sample Standard Deviation:

$s$  has the same units as the original observations

$$s = \sqrt{s^2} = \sqrt{\frac{\sum_{i=1}^n y_i^2 - \frac{\left(\sum_{i=1}^n y_i\right)^2}{n}}{n-1}}$$