MEASURES OF CENTRAL TENDENCY & VARIATION

Measures of central tendency — find the center of the data

$$Mean = \frac{\sum x}{n}$$

x = data
n = # of items
$\sum$ = sum
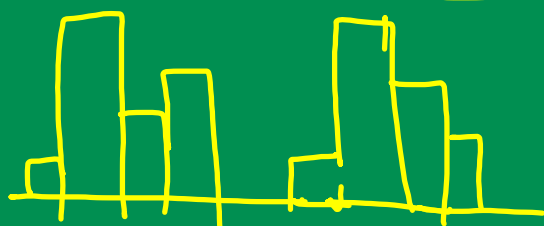
sample
$\bar{x}$

population
μ

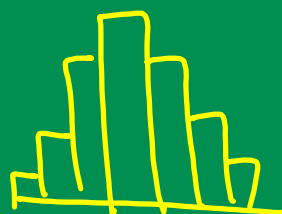Median — the middle value
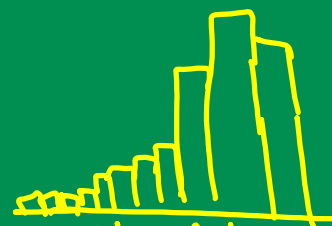i) Data must be in order!
$\frac{n}{2}$ Divides evenly

Mode
most frequent value

Median

Mean

skewed to the left
Median

MEASURES OF VARIATION — measures the "spread" of the data

$$\text{Range} = \text{Highest value} - \text{Lowest value}$$

$$\text{Interquartile Range } (IQR) = Q_3 - Q_1$$

IQR

Q_1 Med. Q_3

Standard Deviation — the "average" of how much each piece of data varies from the mean.

Sample	population
S	σ

$\{7, 13, 16, 17, 19, 24\}$

$\bar{x} = \dfrac{96}{6} = 16$

1) Find mean.

2) Data - Mean

3) Find the mean of the squares

4) Square root of mean

$(-9)^2 + (-3)^2 + (0)^2 + (1)^2 + (3)^2 + (8)^2$

$= \dfrac{164}{6} = \sqrt{27.33} \approx 5.23$

$$\sigma = \sqrt{\dfrac{\sum (x - \mu)^2}{n}}$$

$$S = \sqrt{\dfrac{\sum (x - \bar{x})^2}{n-1}}$$

Chemistry Test

4	2
5	8
6	1 4 8 (9)
7	2 4 4 5 6 $\mid$ 8 9
8	2 2 2 (6) 8
9	1 4 8 9

22 students

$$IQR = Q_3 - Q_1$$

$$Median = \frac{22}{2} = 11^{th} + 12^{th} = 77$$

$$\frac{11}{2} = 5.5 \approx 6^{th}$$

$$Q_1 = 69 \quad Q_3 = 86$$

$$IQR = 86 - 69 = 17$$

Outliers

1) $IQR * 1.5 = 17 \times 1.5 = 25.5$

2) Upper boundary: $86 + 25.5 = 111.5$

3) lower boundary: $86 - 25.5 = 60.5$

$$58 \, \& \, 42 = outliers$$