Range, IQR, & SIR

- Range = Max – Min
- Interquartile Range

IQR = Q3 – Q1

- Semi-Interquartile Range

SIR = (Q3 – Q1) / 2

- Range is super dependent on extreme values or outliers
- IRG & SIR more resistant

Variance

- DEVIANT: how far from the center (mean)
- SQUARE: so + & - don't cancel out to 0 (units are also squared)
- AVERAGE: summarize with a single value
- In a POPULATION: called "sigma-squared"

$$SS = \sum (X_i - mean)^2$$

$$MS = \frac{SS}{df}$$

$$\sigma^2 = \frac{\sum (X_i - \mu)}{N} = \frac{SS}{N} = MS$$

- In a SAMPLE: called "s-squared"

$$s^2 = \frac{\sum (X_i - \bar{X})}{n-1} = \frac{SS}{n-1} = \frac{SS}{df} = MS$$

- *Degrees of Freedom: df = n - 1*

Standard Deviation

- SQUARE-ROOT VARIANCE to get back to the original units
- In a POPULATION: called "sigma"

$$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{\sum (X_i - \mu)}{N}} = \sqrt{\frac{SS}{N}}$$

$$= \sqrt{MS}$$

- In a SAMPLE: called "s"

$$s = \sqrt{s^2} = \sqrt{\frac{\sum (X_i - \bar{X})}{n-1}} = \sqrt{\frac{SS}{n-1}}$$

$$= \sqrt{MS}$$