Main Ideas

- Go over several different measures of dispersion (Range, Variance, Standard Deviation)

- Learn how to calculate these measures of dispersion in Excel
Recap Section 4.1 Measures of Center

Selecting a measure of center

- Mean is only used for quantitative data
- Median and mode can be used for quantitative or qualitative data
- Mean is sensitive to outliers
- Median and mode are not sensitive to outliers

Section 4.2 Measures of Dispersion (Monday)

Range: The difference between the largest and smallest data values

Variance: A measure of how spread out the data is

Standard Deviation: A measure of how much the data varies around the mean

Example: Clara is looking into investing a portion of her recent bonus into the stock market. While researching different companies, she discovers the following standard deviations of one year of daily stock closing prices.

Perfect Plungers Plus: Standard deviation of stock prices = $1.27

Eye Remember Enterprises: Standard deviation of stock prices = $9.82

Based on the data and assuming these trends continue, which company would give Clara a stable long-term investment?
Measures of Dispersion

- **Range**: The difference between the max and min value.

- **Variance**: A measure of spread
  - Always Non-negative (0 or positive)
  - Sensitive to outliers "not resistant"

  Population vs. Sample: Calculated with different denominators in their equation, so they will not be equal to each other.

- **Standard Deviation**: measure of spread from the mean of the data set
  - Always Non-negative (0 or positive)
  - Sensitive to outliers "not resistant"
  - Square root of variance

Population vs. Sample:

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\]
Example:
For full written example see page 2.
Clara is gonna invest and the standard deviation of the stock prices are listed below:

PPP: Std Dev = $1.27
ERE: Std Dev = $9.82

What is the better long-term investment? Perfect Plungers Plus is the better of the two as it has lower variability because it has a lower standard deviation.
Excel formulas for Measures of Dispersion

Range: \( \text{MAX}( ) - \text{MIN}( ) \)

Variance: Population = \text{VAR.PC( )}
Sample = \text{VAR.SC( )}

Std. Dev.: Population = \text{STDEV.PC( )}
Sample = \text{STDEV.SC( )}

*Inside all the parentheses you select the data.
1. Determine the best measure of center, mean, median, or mode. Explain your reasoning.
   
   (a) A doctor is interested in analyzing the increase in systolic blood pressure caused by a certain antibiotic. Would the doctor be more interested in studying the mean, median, or mode of the systolic blood pressures?

   (b) A car manufacturer is trying to decide in what colors it should offer its new sports coupe. In analyzing the preferred colors of other sports coupes, would the manufacturer be more interested in the mean, median, or mode?

2. Briefly describe variance and standard deviation.

3. Consider the following set: \(8 \ 8 \ 8 \ 8 \ 8 \ 8 \ 8\)

   (a) What is the mean, median, and mode of this set? What do these values mean?

   (b) What is the variance and standard deviation of this set? What do these values mean?

   (c) If we add a data value of 100 to this set, describe what happens to the following values. Be able to justify your reasoning.
      
      i. The mean

      ii. The median

      iii. The mode

      iv. The standard deviation

4. Clara is looking into investing a portion of her recent bonus into the stock market. While researching different companies, she discovers the following standard deviations of one year of daily stock closing prices.

   Perfect Plungers Plus: Standard deviation of stock prices =\$9.85
   Garden Statues Express: Standard deviation of stock prices =\$1.07

   Based on the data and assuming these trends continue, which company would give Clara a stable long-term investment? Explain your reasoning.