# Section 10.3:
## Measures of Variation

Two Measures of Variation:
1. Range – difference between the largest number and smallest number
2. Standard Deviation – a measure of the variation from the mean
   a. Population Standard Deviation
   b. Sample Standard Deviation

Example 1:  For this set of numbers—
          7    9    18   22   27   29   32   40

a)  Find the Range

b)  Find the Standard Deviation

Variance: $$s^2 = \frac{\Sigma\left(X - \bar{X}\right)^2}{n-1}$$

Standard Deviation is the square root of the variance.

$$s = \sqrt{\frac{\Sigma\left(X - \bar{X}\right)^2}{n-1}}$$

Example 2:   Find the Standard Deviation for this
grouped data.

| Interval | Frequency |
|----------|-----------|
| 20-24 | 3 |
| 25-29 | 2 |
| 30-34 | 4 |
| 35-39 | 1 |

Standard Deviation for a Grouped Distribution:

$$s=\sqrt{\frac{\sum f\left(X-\bar{X}\right)^2}{n-1}}$$

NOTE:   Group Standard Deviation formula is
calculated differently from textbook so
answers may vary slightly from what is in
text.

Chebyshev's Theorem:
For any distribution of numerical data, at least
$1-\dfrac{1}{k^2}$ of the numbers lie within k standard
deviations of the mean.