FOUR MOMENTS:

Ways to Describe a (Univariate I/R) Distribution

COM 631

Ways to summarize a distribution

- First most important way?

Ways to summarize a distribution

- First most important way?

  - CENTRAL TENDENCY
    - Mean
    - Median
    - Mode

Ways to summarize a distribution

- How about the second most important way?

Ways to summarize a distribution
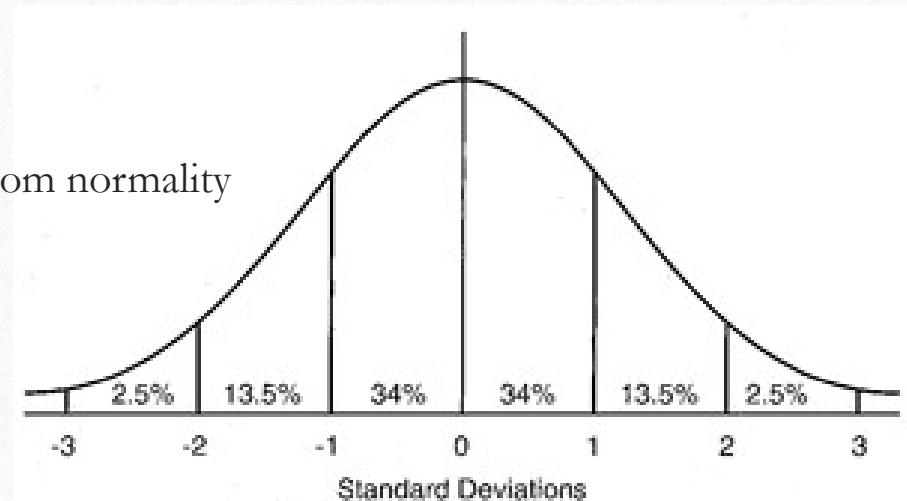
- How about the second most important way?

  - DISPERSION
    - Standard deviation and Variance (s and s^2)
    - Range

Ways to summarize a distribution

- Any other ways?

Ways to summarize a distribution

- Any other ways?

- Think about a normal distribution
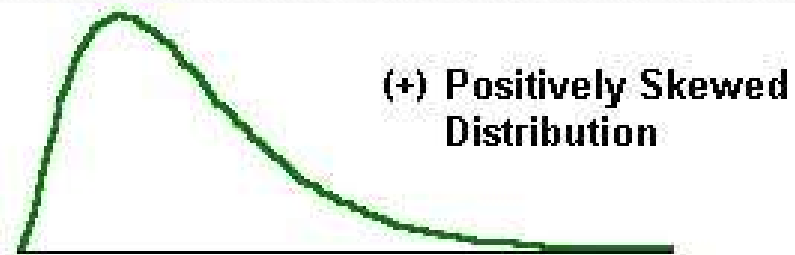 - And ways a distribution can deviate from normality

Skewness and Kurtosis

- Skewness = Asymmetry of a distribution

- Kurtosis = Deviation from normality due to tails that are heavy or light (and the distribution looks too flat or too peaked/pointy)
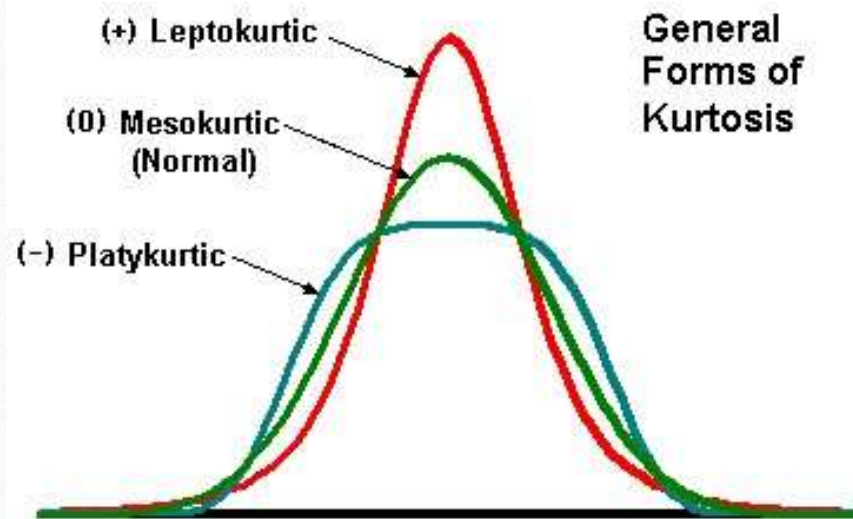
Skew

(+) Positively Skewed Distribution

(-) Negatively Skewed Distribution
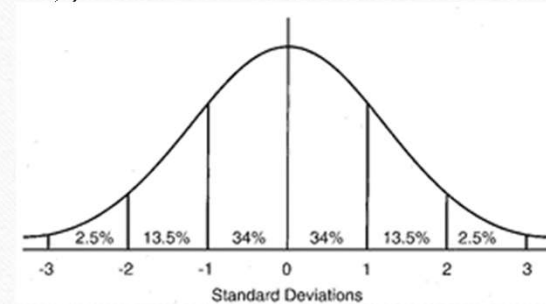
In a perfectly normal distribution, the mean, median, and mode are all the same. In a skewed distribution, they are not. (The mean is the most "sensitive" to extreme scores…remember, that's why we often report median household income rather than mean household income.)
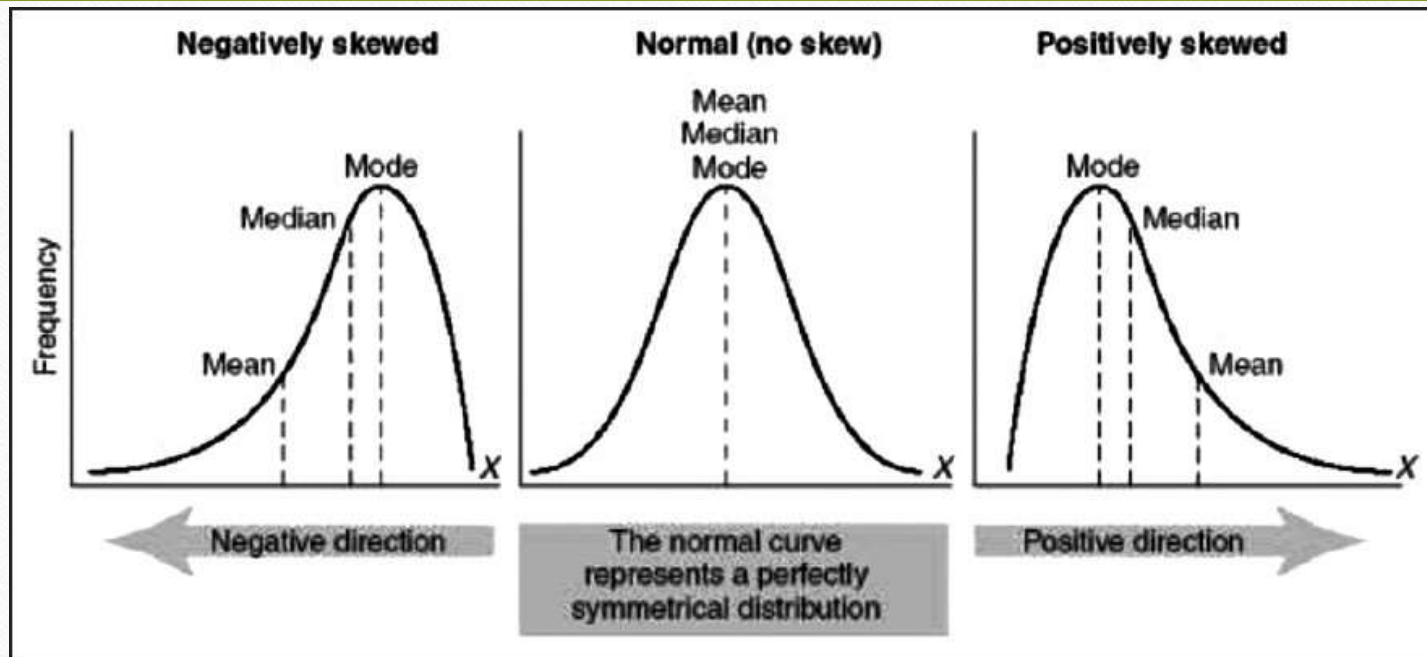
Kurtosis

Rules of Thumb for Skew & Kurtosis

- There are many rules of thumb! A couple examples:
  - If skew or kurtosis is greater than 1.0 or less than -1.0, transform the variable to correct
  - If skew or kurtosis is greater than 3.0 or less than -3.0, transform the variable to correct
- Actually, there are statistical "corrections" for skew and negative kurtosis, but not positive kurtosis (pointiness) … (see handout on Transforming Data)

The Four Moments

- So the four ways to summarize a distribution are:
  - 1 - Central Tendency
  - 2 - Dispersion
  - 3 - Skew
  - 4 - Kurtosis
- These correspond to something called the "four moments," which comes from mechanics. A separate handout explains the connection, if you are interested.

end