KEY

Measures of Center

The **sample mean**, $\bar{x} = \frac{x_1 + x_2 + ... + x_n}{n} = \frac{1}{n}\sum x_i$ or more compactly $\frac{\sum x}{n}$ (*i.e.* it is the sum of all the values of the variable divided by the number of values in the sample).

The **sample median**, M or Md (some use $\tilde{x}$, I won't) is in the "middle" of an *ordered* set of sample data. If n is odd it is the middle observation in the ordered set. If n is even it is the mean of the two middle observations. The rank (position) of the median is $(n + 1)/2$ (this is the *location* or *rank* of the median, it is not its value).

A ***p*% trimmed mean*** is the mean of the remaining data when the highest p% and lowest p% of the values are discarded. (Note that $2p$% of the values are discarded, *e.g.* for a 10% trimmed mean 20% of the values are discarded and the mean of the middle 80% is computed.)

The **mode***, if one exists, is the value which occurs with the greatest frequency.

The **midrange*** is the mean of the minimum (L) and maximum (H) values. $\left(\frac{L+H}{2}\right)$

Find each of these measures for the following set of data:

74, 79, 53, 83, 77, 81, 52, 75, 79, 104, 74, 70, 60, 74, 63, 82, 66, 70, 85, 78

1. mean $\sum x =$ $\bar{x} = 1479/20$ 73.95
2. 10% trimmed mean $\frac{1479-(52+53+85+104)}{16} = \frac{1185}{16}$ 74.0625
3. median 74.5
4. mode (if one exists) 74
5. midrange $\frac{52+104}{2} = \frac{156}{2}$ 78

A **weighted mean*** is used when we don't want to give all the values in a data set the same weight in computing our measure of center. $\bar{x}_{wt} = \frac{\sum xw}{\sum w}$

A politician wants to know what the average annual cost of prescription drugs to patients on Medicare. He finds two studies, the first used a sample of size 120 and had a mean of \$532 and second used a sample of 280 and had a mean \$490.

1. If you had to use one of these estimates, which would you use and why.
   The second since it is the larger sample size
2. When finding the mean of a set of means a weighted mean should be used. Find the weighted mean of the two sample means using as weights the sample sizes.

$$\frac{532 \cdot 120 + 490 \cdot 280}{120 + 280} = \frac{201040}{400} = \$502.60$$

* not in text