04: Measures of Central Tendency

Key Statistics Terms

Center: Approximately the middle of the distribution, measured with the mean or median.
Count: or n, the number of observations in a data set.
Median: the middle value of data, with half of the data above it and half below.
Mean: the sum of all data points divided by the count.
Mode: the observation (number) that occurs most frequently in the data set.

Calculating Median

To calculate the median with an *odd* count:
- Order the observations.
- Find position of median value with formula, $(n + 1) / 2$.
- Determine the value represented by the median position.

To calculate the median with an *even* count:
- Order the observations.
- Find position of the middle two values with formulas, $(n / 2)$ and $(n / 2) + 1$.
- Determine values represented by two middle positions.
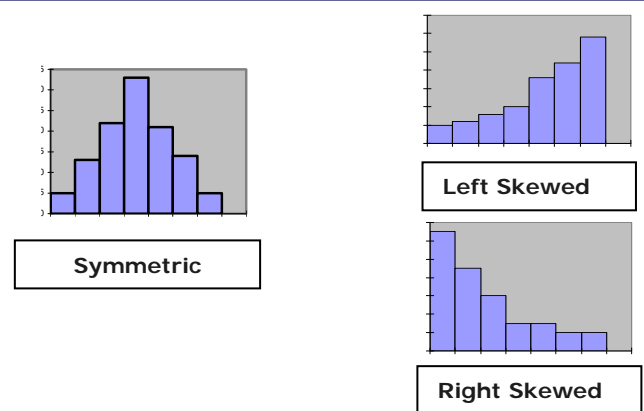- Take average of two middle values to get the median.

Calculating Mean

- Find the sum of all observations in the data set
- Divide the sum by the count to obtain the mean

Calculating Mode

- Order the observations
- Report the value in the data set that occurs the most

Shape Review

Symmetric

Left Skewed

Right Skewed

Mean vs. Median

- Mean = Median, distribution is symmetric.
- Mean < Median, distribution is most likely left skewed.
- Mean > Median, distribution is most likely right skewed.

Median Problem (Odd Count)

Example: Find the median of the following observations:
62, 44, 21, 31, 41, 50, 30, 55, 43

First, order the observations:
21, 30, 31, 41, 43, 44, 50, 55, 62

Second, find the position of median value:
$(9 + 1) / 2 = 10 / 2 = 5$

Lastly, determine the value represented by median position:
The number in the 5th position is 43.

Median Problem (Even Count)

Example: Find the median of the following observations:
46, 62, 44, 21, 31, 41, 50, 30, 55, 43

First, order the observations:
21, 30, 31, 41, 43, 44, 46, 50, 55, 62

Second, find the position of the two middle values:
$(10 / 2) = 5$ and $(10 / 2) + 1 = 6$

Third, determine the value of the two middle positions:
The number in the 5th position is 43.
The number in the 6th position is 44.

Lastly, average two middle values to obtain the median:
$(43 + 44) / 2 = 87 / 2 = 43.5$
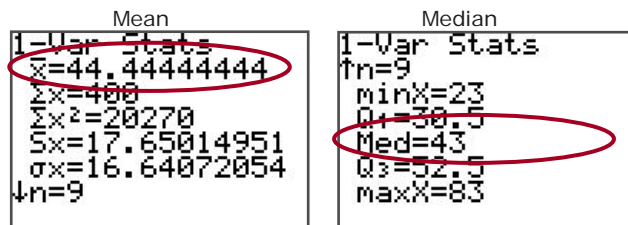
Mean Problem

Example: Find the mean of the following observations:
63, 44, 21, 31, 41, 50, 30, 55, 43

First, find the sum of observations in the data set:
$63 + 44 + 21 + 31 + 41 + 50 + 30 + 55 + 43 = 378$

Second, divide the sum by the count to obtain the mean:
$378 / 9 = 42$

Graphing Calculator

The mean and median can be found using a graphing calculator:

Mean

Median

Changing Units

Sometimes the units of data are changed (seconds to minutes, meters to feet, etc...). The mean and median are both affected in the following ways:

Adding a Constant:
If a constant is added to each data value, the mean and median will be increased by the same constant value.

Multiplying by a Constant:
If each data value is multiplied by a constant, the mean and median will be multiplied by the same constant.

How to Use This Cheat Sheet: These are the keys related this topic. Try to read through it carefully twice then write it out on a blank sheet of paper. Review it again before the exams.