Section F

Measures of Center

Another way to describe a data set is to find numerical summaries of the data. The first type of numerical summary are called measures of center; these values describe the center of the data.

Three Measures of Center:

1) Mean: balance, center of gravity, equal weight on each side of the mean of the histogram
2) Median: cuts the data set in half, 50% on one side of the median 50% on the other
3) Mode: Most frequent value(s) used with both qualitative and quantitative variables

1) Mean – the mean is the point at which the data set would balance,
affected by extreme values in the data set (nonresistant)

Notation: Population mean: $\mu = \frac{\sum x}{N}$ sample mean : $\bar{x} = \frac{\sum x}{n}$

Example: 14 18 34 26 31 56 45 48 23

2) Median: Need to put data in ascending order.
Not affected by extreme values in the data set (resistant)

If the data set is odd, the median is the middle data value.
If the data set is even, the median is the sum of the middle two numbers divided by 2.

Example: Odd number of data values: 45 47 52 54 58 63 65 67 73 75 79

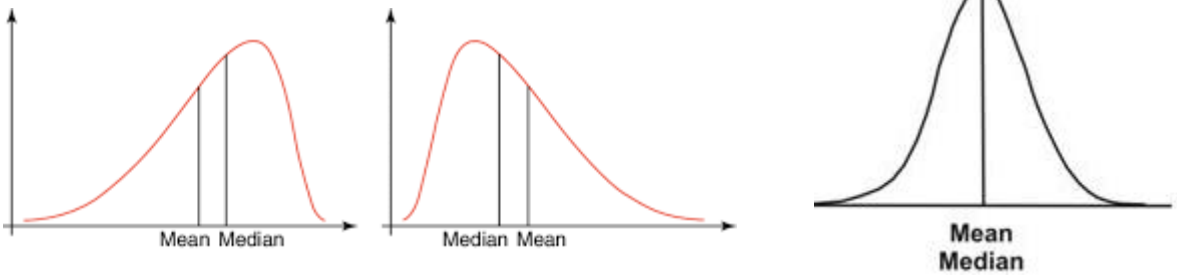
Even number of data values: 56 59 62 64 65 67 68 69 70 74

Comparing the mean and median to determine the shape of the distribution:

Right Skewed: mean > median

Left Skewed: mean < median

Symmetric: mean = median



Left Skewed **Right Skewed** **Symmetric**

3) <u>Mode</u>: The mode of a data set is the value that appears most frequently.
If two or more values are tied for the most frequent, they are all considered to be modes.
If the values all have the same frequency, we say that the data set has no mode.

Example: red red blue blue yellow yellow green red blue green blue blue

More Examples:

1) Given the following set of numbers:

226 227 228 229 229 230 239 241 245 246 247 249 255

Find: a) n = _____ b) $\sum x$ = _____b) Mean_____ c) Median _____ d) Mode _____

e) Is the distribution right skewed, left skewed or symmetric? _____

2) Given the following set of numbers : 10 12 14 15 17 21 22 23

a) n = _____ b) $\sum x$ = _____ c) $\bar{x}$ = _____ d) $\sum(x - 16.75)$= _____

e) If 60 is added to <u>each</u> data value of the above distribution, what will the mean of the resulting distribution equal? _____

f) If each data value of the above distribution is multiplied by 5, what will the mean of the resulting distribution equal?_____