Characteristics of the Different Measures of Central Tendency

Mean:

1. It can only be used with quantitative data sets, unlike the mode.

2. The mean will always exist, but it might not be an actual data value.

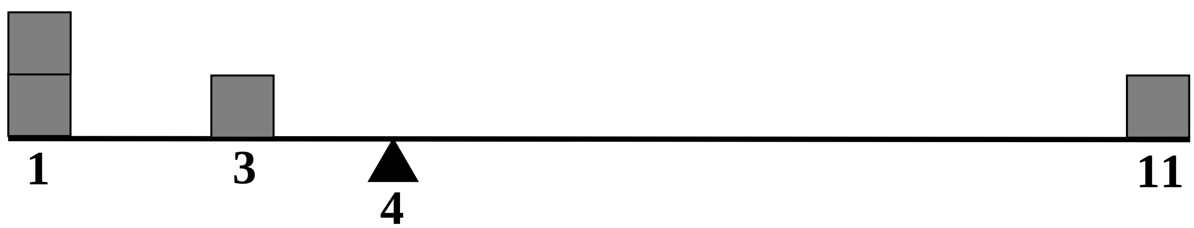
For example: For the data set: $\{1,1,3,6\}$, *the mean is 2.8, which isn't a value in the data set, nor is it a whole number like the values in the data set.*

3. Every data value has an effect on the value of the mean, unlike the median and the mode.

This means that if you change any value in the data set, you change the value of the mean.

4. It is the center of the data set in that it is the balance position of the data values.

For example: For the data set: $\{1,1,3,11\}$, *the mean is 4.*



5. It can be more sensitive to extreme data values and changes in extreme values in the data set than the median or the mode.

For example: For the data set: $\{1,1,3,39\}$, *the mean is 11, the median is 2, and the mode is 1. If the extreme value of 39 is changed to 7, then the mean drops to 3, the median is still 2, and the mode is still 1.*

6. When used as the center value of the data set, it minimizes the sum of the squared deviations.

In other words, the expression $(x_1 - c)^2 + (x_2 - c)^2 + \cdots + (x_n - c)^2$ *takes on its smallest value when c is the mean of the data set.*

Median:

1. It can only be used with quantitative data sets, unlike the mode.

2. The median will always exist, but it might not be an actual data value.

For example: For the data set: $\{1,2,3,6\}$*, the median is 2.5, which isn't a value in the data set, nor is it a whole number like the values in the data set.*

3. The value of the median doesn't depend upon the individual values of the data set like the mean does. The value of the median depends upon the order of the values in the data set.

This means that if you change a value in the data set, you might not change the value of the median.

4. It is the center of the data set in that: At least half of the data values(50%) are greater than or equal to the median, and at least half of the data values(50%) are less than or equal to the median.

5. It can be less sensitive to changes in extreme data values than the mean or the mode.

For example: For the data set: $\{1,1,1,3,3,9\}$*, the mean is 3, the median is 2, and the mode is 1. If one of the extreme values of 1 is changed to 0, and the extreme value of 9 is changed to 3, then the mean drops to 1.8, the median is still 2, and the mode rises to 3.*

6. When used as the center value, it minimizes the sum of the absolute deviations.

In other words, the expression $|x_1 - c| + |x_2 - c| + \cdots + |x_n - c|$ *takes on its smallest value when c is the median of the data set.*

Mode:

1. It can be used with quantitative and qualitative data, unlike the mean and the median.

2. The mode won't always exist like the mean and the median, but if it does, it must be an actual value in the data set.

3. The value of the mode doesn't depend upon the individual values of the data set like the mean does. The value of the mode depends only on the most frequently occurring value in the data set.
This means that if you change a value in the data set, you might not change the value of the mode.

4. It might not be located near the center of the data values.
For example: For the data set: $\{0,1,12,12,12\}$*, the mode is 12, but this value is located to the far right of the values in the data set.*

5. It can be less sensitive to changes in extreme data values than the mean.
For example: For the data set: $\{5,7,7,7,24\}$*, the mean is 10, and the mode is 7. If the extreme value of 5 is changed to 0, and the extreme value of 24 is changed to 9, then the mean drops to 6, while the mode is still 7.*