

Measures of Central Tendency

Essential information

Mean - the arithmetic mean, obtained by adding together all the numbers in a set of data and dividing by how many numbers there are in the set.

For example, the mean of a set of numbers, $x_1, x_2, \dots, x_n$ is calculated from the formula

$$\text{mean} = \frac{x_1 + x_2 + \dots + x_n}{n}$$

So, for the data set $\{5, 7, 2, 5, 1, 2, 3, 5, 6\}$,

$$\text{the mean value} = \frac{(5 + 7 + 2 + 5 + 1 + 2 + 3 + 5 + 6)}{9} = \frac{36}{9} = 4.$$

Median - the median is the middle value when the values are listed in numerical order.

For example, for the data set $\{5, 7, 2, 5, 1, 2, 3, 5, 6\}$, the numerical order is

1, 2, 2, 3, 5, 5, 5, 6, 7
 $\uparrow$
 middle value

and so the median = 5.

Note that if there are an even number of values in the data set, the median is the mean of the middle two values.

For example, for the data set $\{5, 7, 2, 5, 1, 2, 3, 5\}$, the numerical order is

1, 2, 2, 3, 5, 5, 5, 7
 $\uparrow$
 middle value

$$\text{and so the median} = \frac{(3 + 5)}{2} = 4.$$

Mode - the mode is the numerical value that has the highest frequency in a set of data, that is, the value that occurs most often.

For example, for the data set $\{5, 7, 2, 5, 1, 2, 3, 5, 6\}$, you can write the values as

Value	1	2	3	4	5	6	7
Frequency	1	2	1	0	3	1	1

The mode is 5, as it has the highest frequency (3).

Range - the range is the difference between the highest and the lowest values in the data set.

For example, for the data set $\{5, 7, 2, 5, 1, 2, 3, 5, 6\}$,
 the range is $7 - 1 = 6$