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Statistics

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Outline

- Measures of centers
  - Mean
  - Median
  - Mode
  - Range
  - Standard deviation

Arithmetic Mean (Mean or average)

The measure of center obtained by adding the values and dividing the total by the number of values":

Arithmetic mean or simply the mean of a variable is defined as the sum of the observations divided by the number of observations.

$$\mu = \frac{\Sigma x}{N}$$

Example 1

Find the mean of the five measures of BMI: 22, 22 ,26, 24, and 23.

Solution

First add the data values, then divide by the number of data values.

$$\bar{x} = \frac{\Sigma x}{n} = \frac{22+22+26+24+23}{5} = \frac{117}{5} = 23.4$$

The median

The median of a data set is the measure of center that is the middle value when the original data values are arranged in order of increasing (or decreasing) magnitude.

Example 2

Find the median of the five sample values used in Example 1: 22, 22, 26, 24, and 23.

Solution

First sort the data values by arranging them in order, as shown below:

22 22 **23** 24 26

Because the number of data values is an odd number (5), the median is the number located in the exact middle of the sorted list, which is 23. The median is therefore 23. Note that the median of 23 is different from the mean of 23.4 found in Example 1.

The mode

The mode of a data set is the value that occurs with the greatest frequency.

Example 3

Find the mode of these same values used in Example 1:

22, 22, 26, 24 , 23

Solution

The mode is 22, because it is the data value with the greatest frequency.

Range

The range of a set of data values is the difference between the maximum data value and the minimum data value.
Range = (maximum data value) – (minimum data value)

Example 1
Find the range of these numbers of chocolate chips: 22, 22, 26, 24.

Solution
range = (maximum value) — (minimum value) = 26 — 22 = 4.0

Standard Deviation (SD)

Is a measure of how much data values deviate away from the mean, and equal to:

$$s = \sqrt{\frac{\Sigma (x - \bar{x})^2}{n - 1}} \quad \text{or} \quad s = \sqrt{\frac{n(\Sigma x^2) - (\Sigma x)^2}{n(n-1)}}$$

Example 2

Find the standard deviation using the first formula to chocolate chips: 22, 22, 26, 24.

x	$\bar{x}$ (mean)	$(x - \bar{x})$	$(x - \bar{x})^2$	s
22		(23.5 -22)= -1.5	2.25	
22		(23.5 -22)= -1.5	2.25	
26		(23.5 -26)= 2.5	6.25	
24		(23.5 -24)= 0.5	0.25	
$\sum x$=94	$\sum x$/n=94/4 =23.5		$\sum (x - \bar{x})^2$=11	$\sqrt{\sum (x - \bar{x})^2 / 3}$ $=\sqrt{11/3}=\sqrt{2.75} = 1.9$

https://www.thoughtco.com/calculate-a-sample-standard-deviation-3126345

Thank you