

Answer on Question #51601 – Math – Statistics and Probability

Calculate the standard deviation of the marks: 2,3,6,2,5,0,4,2.

- a) 1.5
- b) 1.7
- c) 1.8
- d) 1.9

Solution

The standard deviation is the most common measure of variability, measuring the spread of the data set and the relationship of the mean to the rest of the data. If the data points are close to the mean, indicating that the responses are fairly uniform, then the standard deviation will be small. Conversely, if many data points are far from the mean, indicating that there is a wide variance in the responses, then the standard deviation will be large. If all the data values are equal, then the standard deviation will be zero. The sample standard deviation is calculated by the following formula:

$$\sigma = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2}$$

where

σ is the sample standard deviation.

x_1, \dots, x_N is the sample data set.

\bar{x} is the mean value of the sample data set.

N = size of the sample data set.

Thus, we firstly find the value of the Mean:

$$\text{Mean} = \frac{2 + 3 + 6 + 2 + 5 + 0 + 4 + 2}{8} = 3$$

The Mean is equal to 3.

Then each number will be subtracted from the Mean and the result will be squared. The results of calculation are presented in the following table.

Table

x_j	\bar{x}	$(x_j - \bar{x})^2$
2	3	1
3	3	0
6	3	9
2	3	1
5	3	4
0	3	9
4	3	1
2	3	1
$\sum 24$	$\sum 24$	$\sum 26$

Now we divide the sum of $(x_i - \bar{x})^2 = 26$ by $N-1$. Finally, we can determine the value of the standard deviation.

$$\sigma = \sqrt{\frac{26}{8-1}} = \sqrt{3.7143} = 1.9272$$

So we got the following results of mathematical calculations: the variance is equal to 3.7143 and sample standard deviation is equal to 1.9.

Answer: the standard deviation of the marks is equal to 1.9.