Answer on Question #47040 – Math – Statistics and Probability

Question

For the following population of N=6 scores:

11, 0, 2, 9, 9, 5

(a) calculate the range and standard deviation.

(b) add 2 points to each score and compute the range and standard deviation again. Describe how adding a constant to each score influences measures of variability.

Solution

							Min	Max	Range	Mean	S. D.
scores	11	0	2	9	9	5	0	11	11	6	4
scores + 2	13	2	4	11	11	7	2	13	11	8	4
scores^2	121	0	4	81	81	25				52	
$(\text{scores} + 2)^2$	169	4	16	121	121	49				80	

(a) The minimum value of population is 0 and the maximum value is 11, so the range of population is 11 – 0 = 11.

The mean of population equals

$$\text{Mean} = \frac{11 + 0 + 2 + 9 + 9 + 5}{6} = \frac{36}{6} = 6.$$

The mean of population squares equals

$$\text{Mean of squares} = \frac{121 + 0 + 4 + 81 + 81 + 25}{6} = \frac{312}{6} = 52.$$

Hence the standard deviation equals

$$\text{S. D.} = \sqrt{\text{Mean of squares} - \text{Mean}^2} = \sqrt{52 - 6^2} = \sqrt{16} = 4.$$

(b) The minimum value of population is 2 and the maximum value is 13, so the range of population is 13 – 2 = 11.

The mean of population equals

$$\text{Mean} = \frac{13 + 2 + 4 + 11 + 11 + 7}{6} = \frac{48}{6} = 8.$$

The mean of population squares equals

$$\text{Mean of squares} = \frac{169 + 4 + 16 + 121 + 121 + 49}{6} = \frac{480}{6} = 80.$$

Hence the standard deviation equals

$$\text{S. D.} = \sqrt{\text{Mean of squares} - \text{Mean}^2} = \sqrt{80 - 8^2} = \sqrt{80 - 64} = \sqrt{16} = 4.$$

The range and standard deviation don't change if we add constant to each element of population.

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