

Important Questions for Class 11 Maths Chapter 13 - Statistics

Question 1:

The variance of the given data 2, 4, 5, 6, 8, 17 is 23.33. Then find the variance for the data 4, 8, 10, 12, 16, 34.

(a) 23.23 (b) 25.33 (c) 46.66 (d) 48.66

Solution:

A correct answer is an **option (c)**

Explanation:

For the given data: 2, 4, 5, 6, 8, 17, the variance is 23.33.

To find the variance for the data: 4, 8, 10, 12, 16, 34

If you notice the data which you have to find the variance, it is the multiple of the given data.

So, multiply the variance of the given data by 2,

It means that, $23.33 \times 2 = 46.66$

Thus, the variance of the data: 4, 8, 10, 12, 16, 34 is 46.66

Question 2:

Find the variance and the standard deviation for the following data: 57, 64, 43, 67, 49, 59, 44, 47, 61, 59

Solution:

Given data: 57, 64, 43, 67, 49, 59, 44, 47, 61, 59

To find mean (μ):

$$\text{Mean } (\mu) = (57 + 64 + 43 + 67 + 49 + 59 + 44 + 47 + 61 + 59) / 10$$

$$= 550 / 10$$

$$\text{Mean} = 55$$

To find Variance (σ^2):

$$\text{Variance}(\sigma^2) = (x_i - \mu)^2/n$$

$$=(2^2+9^2+12^2+12^2+6^2+4^2+6^2+4^2+11^2+8^2)/10$$

$$= 662/10$$

$$=66.2$$

Therefore, variance(σ^2) = 66.2

To find standard deviation (σ):

To find the standard deviation, take the square root of variance, we get

$$\text{Standard Deviation}(\sigma) = \sqrt{(\sigma^2)}$$

$$= \sqrt{66.2} = 8.13$$

Therefore, the standard deviation is 8.13

Question 3:

The coefficients of variations for the two distributions are 60 and 70 and its standard deviations are 21 and 16 respectively. Determine its arithmetic mean.

Solution:

Given that,

$$\text{Coefficient of Variations (C.V of 1st distribution)} = 60, \sigma_1 = 21$$

$$\text{Coefficient of Variations (C.V of 2nd distribution)} = 70, \sigma_2 = 16$$

Let μ_1 and μ_2 are the means of the 1st and the 2nd distribution.

We know that the formula to find the arithmetic mean is given as:

$$\text{Coefficient of Variations(C.V)} = (\text{Standard Deviation/arithmic Mean}) \times 100$$

$$\text{Thus, Arithmetic Mean} = (\text{Standard Deviation/C.V}) \times 100$$

Therefore, the arithmetic mean for the 1st deviation is given by:

$$\mu_1 = [\sigma_1 / (\text{c.v of 1st distribution})] \times 100$$

$$\mu_1 = (21/60) \times 100$$

$$\mu_1 = 0.35 \times 100$$

$$\mu_1 = 35$$

Similarly for μ_2 :

$$\mu_2 = [\sigma_2 / (\text{c.v of 2nd distribution})] \times 100$$

$$\mu_2 = (16/70) \times 100$$

$$\mu_2 = 0.2285 \times 100$$

$$\mu_2 = 22.85$$

Therefore, the arithmetic mean for the 1st and the 2nd distributions are 35 and 22.85 respectively.

Question 4:

Find the mean deviation about mean for the following data:

Size (x)	1	3	5	7	9	11	13	15
Frequency (f)	3	3	4	14	7	4	3	4

Solution:

Let mean = μ

The formula to find mean is

$$\mu = \frac{f_i x_i}{N}$$

$$N = 3+3+4+14+7+4+3+4 = 42$$

$$\mu = \frac{(3 \times 1 + 3 \times 3 + 4 \times 5 + 14 \times 7 + 7 \times 9 + 4 \times 11 + 3 \times 13 + 4 \times 15)}{42}$$

$$\mu = \frac{336}{42}$$

$$\mu = 8$$

Now, to find the mean deviation about mean:

The formula is:

$$M.D(\mu) = \frac{f_i |x_i - \mu|}{N}$$

$$M.D(\mu) = \frac{[3(7) + 3(5) + 4(3) + 14(1) + 7(1) + 4(3) + 3(5) + 4(7)]}{42}$$

$$= \frac{(21 + 15 + 12 + 14 + 7 + 12 + 15 + 28)}{42}$$

$$= \frac{62}{21}$$

$$= 2.95$$

Therefore, the mean deviation about mean for the given data is 2.95

Question 5:

Determine the mean deviation about the median for the following data:

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	7	15	16	4	2

Solution:

From the given data:

Class	Frequency (f _i)	Cumulative frequency (c.f)	Midpoints (x _i)	x _i – Median	f _i x _i – Median
0-10	6	6	5	23	138
10-20	7	13	15	13	91
20-30	15	28	25	3	45
30-40	16	44	35	7	112
40-50	4	48	45	17	68
50-60	2	50	55	27	54
	50				508

From this, it is noticed that the class interval containing 25th item is 20-30. Therefore, the median is 20-30.

We know that the formula for the median is given as:

$$\text{Median} = l + \left\{ \frac{[(N/2) - C]}{f} \times h \right\}$$

Here $l = 20$, $f = 15$, $C = 13$, $N = 50$, and $h = 10$

Now substitute these values in the formula, we get:

$$\text{Median} = 20 + \left\{ \frac{[(25 - 13)]}{15} \times 10 \right\}$$

$$= 20 + 8$$

$$= 28$$

Therefore, median is 28.

Hence, the mean deviation about the median is given by:

M.D(M)=

$$\frac{1}{N} \sum_{i=1}^n f_i |x_i - M|$$

$$M.D(M) = \frac{1}{50} 508$$

$$M.D(M) = 10.16$$

Hence, the mean deviation about the median is 10.16.