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Ex 15.2 Class 11 Maths Question 1.

6, 7, 10, 12, 13, 4, 8, 12

Solution:

Here $x_i = 6, 7, 10, 12, 13, 4, 8, 12$

$$\therefore \sum x_i = 6 + 7 + 10 + 12 + 13 + 4 + 8 + 12 = 72$$

$$n = 8$$

$$\therefore \text{Mean } (\bar{x}) = \frac{72}{8} = 9$$

$$\begin{aligned} \text{Now, } \sum x_i^2 &= (6)^2 + (7)^2 + (10)^2 + (12)^2 + (13)^2 \\ &\quad + (4)^2 + (8)^2 + (12)^2 \\ &= 36 + 49 + 100 + 144 + 169 + 16 + 64 + 144 \\ &= 722 \end{aligned}$$

$$\therefore \text{Variance } (\sigma^2) = \frac{n \sum x_i^2 - (\sum x_i)^2}{n^2}$$

$$= \frac{8 \times 722 - (72)^2}{(8)^2}$$

$$= \frac{5776 - 5184}{64} = \frac{592}{64} = 9.25$$

Ex 15.2 Class 11 Maths Question 2.

First n natural numbers

Solution:

Here $x_i = 1, 2, 3, 4, \dots, n$

$$\therefore \Sigma x_i = 1 + 2 + 3 + 4 + \dots + n = \frac{n(n+1)}{2}$$

$$\therefore \text{Mean } (\bar{x}) = \frac{n(n+1)}{2n} = \frac{(n+1)}{2}$$

$$\begin{aligned} \Sigma x_i^2 &= (1)^2 + (2)^2 + (3)^2 + (4)^2 + \dots + n^2 \\ &= \frac{n(n+1)(2n+1)}{6} \end{aligned}$$

\therefore Variance (σ^2)

$$= \frac{n \times \frac{n(n+1)(2n+1)}{6} - \left[\frac{n(n+1)}{2} \right]^2}{n^2}$$

$$= \frac{(n+1)(2n+1)}{6} - \frac{(n+1)^2}{4}$$

$$= \frac{(n+1)}{2} \left(\frac{2n+1}{3} - \frac{(n+1)}{2} \right)$$

$$= \frac{(n+1)}{2} \left(\frac{4n+2-3n-3}{6} \right)$$

$$= \frac{(n+1)(n-1)}{12} = \frac{n^2-1}{12}$$