DPP

DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : MATHS
DPP No. :1

Topic :-STATISTICS

1 **(d)**

Since variance is independent of change of origin. Hence, variance of observations 101, 102, ..., 200 is same as variance of observations 151, 152, ...,250.

$\therefore V_A = V_B$

$\Rightarrow \frac{V_A}{V_B} = 1$

3 **(a)**

Let $x_1, x_2, \ldots, x_n$ be n values of X. Then,

$\sigma^2 = \frac{1}{n} \sum_{i=1}^{n} (x_i - \overline{X})^2 \quad \ldots(i)$

The variable $a\,X + b$ takes values $a\,x_1 + b$, $a\,x_2 + b, \ldots, a\,x_n + b$ with mean $a\,\overline{X} + b$

$\therefore \text{Var}(aX + b) = \frac{1}{n} \sum_{i=1}^{n} \{(ax_i + b) - (a\overline{X} + b)\}^2 = a^2 \frac{1}{n} \sum_{i=1}^{n} (x_i - \overline{X})^2$

$\Rightarrow (\text{S.D. of } a\,X + b) = \sqrt{a^2 \frac{1}{n} \sum_{i=1}^{n} (x_i - \overline{X})^2} = |a|\sigma$

4 **(c)**

Total weight of 9 items $= 15 \times 9 = 135$

And total weight of 10 items $= 16 \times 10 = 160$

$\therefore$ weight of 10th item $= 160 - 135 = 25$

5 **(d)**

$\bar{x} = \frac{-1 + 0 + 4}{3} = 1$

$\therefore MD = \frac{\Sigma|x_i - \bar{x}}{n}$

$= \frac{|-1 - 1| + |0 - 1| + |4 - 1|}{3}$

$= 2$

6 **(c)**

$$\theta = \tan^{-1}\left\{\frac{\frac{2}{3}\times\frac{4}{3}-1}{\frac{2}{3}+\frac{4}{3}}\right\}$$

$$\Rightarrow\theta = \tan^{-1}\left\{-\frac{\frac{1}{9}}{2}\right\} = \tan^{-1}\left\{-\frac{1}{18}\right\}$$

∴ Angle is acute angle.

∴ k=$\frac{1}{18}$

7 **(a)**

According to the given condition

$$6.80 = \frac{\begin{bmatrix}(6-a)^2+(6-b)^2+(6-8)^2\\+(6-5)^2+(6-10)^2\end{bmatrix}}{5}$$

$\Rightarrow 34 = (6-a)^2 + (6-b)^2 + 4 + 1 + 16$

$\Rightarrow (6-a)^2 + (6-b)^2 = 13 = 9 + 4 = 3^2 + 2^2$

$\Rightarrow \quad a = 3, b = 4$

8 **(b)**

On arranging the terms in increasing order of magnitude

40,42,45,47,50,51,54,55,57

Number of terms ,N=9

∴ Median $= \left(\frac{9+1}{2}\right)$th term = 5th term = 50kg

Weight (kg)	**Deviation from median (d)**	**|d|**
40	-10	10
42	-8	8
45	-5	5
47	-3	3
50	0	0
51	1	1
54	4	4
55	5	5
57	7	7
		|d|=43

MD from median=$\frac{43}{9}$ = 4.78kg

∴ Coefficient of MD from median

$$= \frac{\text{MD}}{\text{median}}$$

$$= \frac{4.78}{50} = 0.0956$$

9 **(c)**

The required weighted mean is given by

$$\overline{X} = \frac{1 \cdot 1 + 2 \cdot 2 + 3 \cdot 3 + \ldots + n \cdot n}{1 + 2 + 3 + \ldots + n}$$

$$\Rightarrow \overline{X} = \frac{\frac{n(n+1)(2n+1)}{6}}{\frac{n(n+1)}{2}} = \frac{2n+1}{3}$$

11 **(a)**

We have, $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$

$$\therefore \quad \text{var}(\bar{x}) = \frac{1}{n^2}\left[\sum_{i=1}^{n} \text{var}(x_i) + 2\sum_{i \neq j}^{n} \text{cov}(x_i, x_j)\right]$$

$$= \frac{1}{n^2}[n\sigma^2] = \frac{\sigma^2}{n}$$

[$\because x_i$ and x_j are independent variable, therefore $\text{cov}(x_i, x_j) = 0$]

14 **(b)**

The required AM is

$$\overline{X} = \frac{1 + 2 + 2^2 + 2^3 + \ldots + 2^n}{n+1}$$

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

15 **(a)**

Given, $r = 0.8$ *and* $b_{yx} = 0.2$

$\therefore r^2 = b_{xy} b_{yx}$

$\Rightarrow (0.8)^2 = b_{xy}.(0.2)$

$$\Rightarrow b_{xy} = \frac{0.64}{0.2} = 3.2$$

16 **(b)**

If the values of mean, median and mode coincide, then the distribution is symmetric distribution.

17 **(c)**

$$r = \frac{\frac{1}{n}\Sigma xy - \bar{x}\bar{y}}{\sigma_x \times \sigma_y} = \frac{\frac{1}{10} \times 12 - 0}{2 \times 3} = 0.2$$

18 **(b)**

In the given distribution 6 occurs most of the times hence mode of the series=6.

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	D	D	A	C	D	C	A	B	C	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	A	D	C	B	A	B	C	B	B	D