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.

$\therefore V_A = V_B$

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

3	**(a)**
Let $x_1, x_2, \ldots, x_n$ be n values of X. Then,

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

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

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

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

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)**

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

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

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

$= 2$

6	**(c)**

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

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

$\therefore$ Angle is acute angle.

$$\therefore k=\frac{1}{18}$$

7 **(a)**

According to the given condition

$$6.80 = \frac{\left[\begin{array}{c}(6-a)^2 + (6-b)^2 + (6-8)^2 \\ +(6-5)^2 + (6-10)^2\end{array}\right]}{5}$$

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

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

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

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

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

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$=\frac{43}{9} = 4.78$kg

$\therefore$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

$$\overline{X} = \frac{1\cdot1 + 2\cdot2 + 3\cdot3 + \cdots + n\cdot n}{1+2+3+\cdots+n}$$

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

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

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

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

15 **(a)**

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

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

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

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

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