

# NDA 1 2025

LIVE

# MATHS

## STATISTICS - 1

# MCQS



NAVJYOTI SIR

Crack  
EXAMS



## 27 Feb 2025 Live Classes Schedule

9:00AM	27 FEBRUARY 2025 DAILY DEFENCE UPDATES	DIVYANSHU SIR
10:00AM	27 FEBRUARY 2025 DAILY CURRENT AFFAIRS	RUBY MA'AM

### NDA 1 2025 LIVE CLASSES

✓ 10:00AM	MATHS - STATISTICS - CLASS 1	NAVJYOTI SIR
✓ 11:30AM	GK - INDIAN GEOGRAPHY - CLASS 1	RUBY MA'AM
✓ 1:00PM	CHEMISTRY - CLASS 3	SHIVANGI MA'AM
✓ 4:30PM	ENGLISH - USAGE OF PAIRED WORDS - CLASS 1	ANURADHA MA'AM

### CDS 1 2025 LIVE CLASSES

✓ 11:30AM	GK - INDIAN GEOGRAPHY - CLASS 1	RUBY MA'AM
✓ 1:00PM	CHEMISTRY - CLASS 3	SHIVANGI MA'AM
✓ 4:30PM	ENGLISH - USAGE OF PAIRED WORDS - CLASS 1	ANURADHA MA'AM



If a random variable (x) follows binomial distribution with mean 5 and variance 4, and  $5^{23}P(X=3) = \lambda 4^\lambda$ , then what is the value of  $\lambda$ ?

- (a) 3
- (b) 5
- (c) 23
- (d) 25

$$np = 5$$

$$npq = 4$$

$$q = \frac{4}{5}; p = 1 - \frac{4}{5} = \frac{1}{5}$$

$$n \left( \frac{1}{5} \right) = 5 \Rightarrow \underline{n = 25}$$

$$5^{23} P(X=3) = \lambda 4^\lambda$$

$$5^{23} {}^{25}C_3 \left( \frac{1}{5} \right)^3 \left( \frac{4}{5} \right)^{22}$$

$$\cancel{5^{23}} \times \frac{\cancel{25} \times \cancel{24} \times 23}{3 \times 2} \times \frac{1 \times 4^{22}}{\cancel{5^{25}}}$$

$$4^{23} \times 23 = \lambda 4^\lambda$$

$$\lambda = 23$$

If a random variable ( $x$ ) follows binomial distribution with mean 5 and variance 4, and  $5^{23}P(X=3) = \lambda 4^\lambda$ , then what is the value of  $\lambda$  ?

- (a) 3
- (b) 5
- (c) 23
- (d) 25

**Ans: C**



From data  $(-4, 1)$ ,  $(-1, 2)$ ,  $(2, 7)$  and  $(3, 1)$ , the regression line of  $y$  on  $x$  is obtained as  $y = a + bx$ , then what is the value of  $2a + 15b$  ?

- (a) 6
- (b) 11
- (c) 17
- (d) 21

$n = 4$

$x$	$y$	$xy$	$x^2$
-4	1	-4	16
-1	2	-2	1
2	7	14	4
3	1	3	9

$\sum x = 0$   
 $\sum y = 11$   
 $\sum xy = 11$   
 $\sum x^2 = 30$

$$a = \frac{\sum y - \sum x}{n}$$

$$b = \frac{\sum xy - \sum x \sum y}{\sum x^2 - (\sum x)^2}$$

$$a = \frac{11 - 0}{4}$$

$$a = \frac{11}{4}$$

$$b = \frac{\sum xy - \sum y \sum x}{\sum x^2 - (\sum x)^2}$$

$$= \frac{11 - 11(0)}{30 - (0)^2} = \frac{11}{30}$$

$$2a + 15b = 2\left(\frac{11}{4}\right) + 15\left(\frac{11}{30}\right) = \frac{11}{2} + \frac{11}{2} = 11$$

From data  $(-4, 1)$ ,  $(-1, 2)$ ,  $(2, 7)$  and  $(3, 1)$ , the regression line of  $y$  on  $x$  is obtained as  $y = a + bx$ , then what is the value of  $2a + 15b$  ?

- (a) 6
- (b) 11
- (c) 17
- (d) 21

**Ans: B**

Let  $x + 2y + 1 = 0$  and  $2x + 3y + 4 = 0$  are two lines of regression computed from some bivariate data. If  $\theta$  is the acute angle between them, then what is the value of  $488 \tan 3\theta$  ?

- (a) 191
- (b) 161
- (c) 131
- (d) 121

$$x + 2y + 1 = 0$$

$$m_1 = b_{yx} = -\frac{1}{2}$$

$$m_1 = -\frac{1}{2} ; \quad m_2 = -\frac{2}{3}$$

$$2x + 3y + 4 = 0$$

$$b_{xy} = -\frac{3}{2} ; \quad m_2 = \frac{1}{b_{xy}} = -\frac{2}{3}$$



$$\tan \theta = \left| \frac{m_1 - m_2}{1 + m_1 m_2} \right|$$

$$= \left| \frac{-\frac{1}{2} + \frac{2}{3}}{1 + \left(\frac{1}{3}\right)} \right| = \frac{1}{6} \times \frac{3}{4} = \frac{1}{8}$$

$$\tan 3\theta = \frac{3 \tan \theta - \tan^3 \theta}{1 - 3 \tan^2 \theta}$$

$$488 \tan 3\theta = \frac{3 \left(\frac{1}{8}\right) - \left(\frac{1}{8}\right)^3}{1 - 3 \left(\frac{1}{8}\right)^2} = \frac{\frac{3}{8} - \frac{1}{512}}{\frac{64 - 3}{64}} \times 488 = \frac{512}{8} \times \frac{61}{64} = 191$$

$$\frac{\cancel{488} \times 192 - 1 \times \cancel{64}}{\cancel{8} \times \cancel{64}}$$

191

Let  $x + 2y + 1 = 0$  and  $2x + 3y + 4 = 0$  are two lines of regression computed from some bivariate data. If  $\theta$  is the acute angle between them, then what is the value of  $488 \tan 3\theta$  ?

- (a) 191
- (b) 161
- (c) 131
- (d) 121

**Ans: A**

If two random variables  $X$  and  $Y$  are connected by relation

$\frac{2X-3Y}{5X+4Y} = 4$  and  $X$  follows Binomial distribution with parameters  $n = 10$  and

$p = \frac{1}{2}$ , then what is the variance of  $Y$ ?

- (a)  $\frac{810}{361}$   
 (b)  $\frac{9}{19}$   
 (c)  $\frac{21}{361}$   
 (d)  $\frac{121}{361}$

$$\left\{ \begin{array}{l} \frac{2X-3Y}{5X+4Y} = 4 \end{array} \right\}$$

$$2X - 3Y = 20X + 16Y$$

$$-18X = 19Y$$

$$Y = \left( \frac{-18}{19} \right) X$$

$$\frac{X}{n=10}$$

$$p = \frac{1}{2}; q = \frac{1}{2}$$

$$\text{Var}(X) = npq = 10 \times \frac{1}{2} \times \frac{1}{2}$$

$$\underline{\underline{\text{Var}(X) = \frac{5}{2}}}$$

$$\begin{aligned}\text{Var}(Y) &= \text{Var}\left(\frac{-18}{19}x\right) = \left(\frac{-18}{19}\right)^2 \text{Var}(x) \\ &= \frac{162}{\cancel{324}} \times \frac{5}{\cancel{2}} = \frac{810}{361}\end{aligned}$$

$$\text{Var}(A) = m$$

$$\text{Var}(kA) = k^2 m$$

If two random variables  $X$  and  $Y$  are connected by relation

$$\frac{2X - 3Y}{5X + 4Y} = 4 \text{ and } X \text{ follows Binomial}$$

distribution with parameters  $n = 10$  and

$p = \frac{1}{2}$ , then what is the variance of  $Y$ ?

(a)  $\frac{810}{361}$

(b)  $\frac{9}{19}$

(c)  $\frac{21}{361}$

(d)  $\frac{121}{361}$

**Ans: A**

An edible oil is sold at the rates 150, 200, 250, 300 rupees per litre in four consecutive years. Assuming that an equal amount of money is spent on oil by a family in every year during these years, what is the average price of oil in rupees (approximately) per litre ?

- (a) 210
- (b) 220
- (c) 230
- (d) 240

$$\frac{150 + 200 + 250 + 300}{4} = \frac{900}{4} = 225$$

↓ round off

(230)



An edible oil is sold at the rates 150, 200, 250, 300 rupees per litre in four consecutive years. Assuming that an equal amount of money is spent on oil by a family in every year during these years, what is the average price of oil in rupees (approximately) per litre ?

- (a) 210
- (b) 220
- (c) 230
- (d) 240

**Ans: C**

$x_i$	1	2	3	...	$n$
$f_i$	1	$2^{-1}$	$2^{-2}$	...	$2^{-(n-1)}$

What is  $\sum_i^n x_i f_i$  equal to?

$n = 2$

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

$\sum_{i=1}^2 x_i f_i = (1 \times 1) + (2 \times 2^{-1}) = 1 + 1 = 2 \checkmark$

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

(a)  $\frac{2^3 - 2 + 2}{2} = 4 \quad \alpha$

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

(b)  $\frac{2^3 - 2 - 2}{2} = \frac{4}{2} = 2 \checkmark$

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

$x_i$	1	2	3	...	$n$
$f_i$	1	$2^{-1}$	$2^{-2}$	...	$2^{-(n-1)}$

What is  $\sum_i^n x_i f_i$  equal to ?

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

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

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

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

**Ans: B**

$x_i$	1	2	3	...	$n$
$f_i$	1	$2^{-1}$	$2^{-2}$	...	$2^{-(n-1)}$

$$\bar{x} = \frac{\sum x_i f_i}{\sum f_i}$$

What is the mean of the distribution ?

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

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

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

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

for  $n=2$ ,

$$\bar{x} = \frac{2}{1 + 2^{-1}} = \frac{2 \times 2}{3} = \frac{4}{3}$$

(a)  $\frac{2^3 - 2 + 2}{4 - 1} = \frac{8}{3} \text{ — } \alpha$

(c)  $\frac{8 - 2 - 2}{4 - 1} = \frac{4}{3} \checkmark$

(b)  $\frac{2^3 - 2 - 2}{2^{2-1}} = \frac{4}{2} = 2 \text{ — } \alpha$

$x_i$	1	2	3	...	$n$
$f_i$	1	$2^{-1}$	$2^{-2}$	...	$2^{-(n-1)}$

What is the mean of the distribution ?

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

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

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

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

Ans: C

The marks obtained by 10 students in a Statistics test are 24, 47, 18, 32, 19, 15, 21, 35, 50 and 41.

What is the mean deviation of the largest five observations?

- (a) 4.8
- (b) 5.5
- (c) 6
- (d) 7.5

$$32 \quad 35 \quad \underline{41} \quad 47 \quad 50$$

$$\bar{x} = \frac{32 + 35 + 41 + 47 + 50}{5} = \frac{205}{5} = 41$$

$$\text{Mean deviation} = \frac{|x_i - \bar{x}|}{n}$$

$$= \frac{9 + 6 + 0 + 6 + 9}{5} = \frac{30}{5} = 6$$



The marks obtained by 10 students in a Statistics test are 24, 47, 18, 32, 19, 15, 21, 35, 50 and 41.

What is the mean deviation of the largest five observations ?

- (a) 4.8
- (b) 5.5
- (c) 6
- (d) 7.5

**Ans: C**

What is the variance of the largest five observations ?

(a) 14.6

(b) 21.8

(c) 25.2

(d) 46.8

32      35      41      47      50

$$\text{Variance} = \frac{(x_i - \bar{x})^2}{n}$$

$$= \frac{9^2 + 6^2 + 0^2 + 9^2 + 6^2}{5} = \frac{2(81 + 36)}{5}$$

$$= \frac{234}{5} = 46.8$$

What is the variance of the largest five observations ?

- (a) 14.6
- (b) 21.8
- (c) 25.2
- (d) 46.8

**Ans: D**

Q) The mean of 10 observations is 5. If 2 is added to each observation and then multiplied by 3, then what will be the new mean ?

- (a) 5  
(c) 15

- (b) 7  
(d) 21

$$5 \xrightarrow{+2} 7 \xrightarrow{\times 3} (21)$$

$$\text{Mean}(x) = a$$

$$\text{Mean}(x+k) = a+k$$

$$\text{Mean}(x-k) = a-k$$

$$\text{Mean}(kx) = ka$$

$$\text{Mean}\left(\frac{x}{k}\right) = \frac{a}{k}$$

Q) The mean of 10 observations is 5. If 2 is added to each observation and then multiplied by 3, then what will be the new mean ?

- (a) 5
- (c) 15

- (b) 7
- (d) 21

**Ans: (d)**

Q) Variance is always independent of the change of

- (a) origin but not scale
- (b) scale only
- (c) both origin and scale
- (d) None of the above

$$\begin{aligned} \text{Var}(X) &= m \\ \rightarrow \text{Var}(kX) &= k^2 m \\ \rightarrow \text{Var}(X \pm k) &= m \end{aligned}$$

dependent on  
change in  
scale

independent of  
change in origin



**Q)** Variance is always independent of the change of

- (a) origin but not scale
- (b) scale only
- (c) both origin and scale
- (d) None of the above

**Ans: (a)**

Q) The variance of 20 observations is 5. If each observation is multiplied by 2, then what is the new variance of the resulting observations ?

- (a) 5  
(c) 20

- (b) 10  
(d) 40

$$\text{Var}(X) = 5$$

$$\begin{aligned}\text{Var}(2X) &= 2^2 \times \text{Var}(X) \\ &= 4 \times 5 = \textcircled{20}\end{aligned}$$

Q) The variance of 20 observations is 5. If each observation is multiplied by 2, then what is the new variance of the resulting observations ?

- (a) 5
- (c) 20

- (b) 10
- (d) 40

**Ans: (c)**

Q) If two regression lines between height (x) and weight (y) are  $4y - 15x + 410 = 0$  and  $30x - 2y - 825 = 0$ , then what will be the correlation coefficient between height and weight?

- (a)  $\frac{1}{3}$       (b)  $\frac{1}{2}$       (c)  $\frac{2}{3}$       (d)  $\frac{3}{4}$

$$4y - 15x + 410 = 0$$

$$30x - 2y - 825 = 0$$

$$b_{yx} = \text{slope} = \frac{-(-15)}{4} = \frac{15}{4}$$

$$b_{xy} = \frac{2}{30} = \frac{1}{15}$$

$$r = \sqrt{b_{yx} \times b_{xy}} = \sqrt{\frac{15}{4} \times \frac{1}{15}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$$

Q) If two regression lines between height (x) and weight (y) are  $4y - 15x + 410 = 0$  and  $30x - 2y - 825 = 0$ , then what will be the correlation coefficient between height and weight?

- (a)  $\frac{1}{3}$       (b)  $\frac{1}{2}$       (c)  $\frac{2}{3}$       (d)  $\frac{3}{4}$

Ans: (b)

Q) What is the arithmetic mean of the series

$${}^n C_0, {}^n C_1, \dots, {}^n C_n, ?$$

(a)  $\frac{2^n}{n}$

(b)  $\frac{2^n}{(n+1)}$

(c)  $\frac{2^{(n+1)}}{n}$

(d)  $\frac{2^{(n+1)}}{(n+1)}$

$$\text{Mean} = \frac{2^n}{n+1}$$

"

$${}^n C_0 + {}^n C_1 + \dots + {}^n C_n = 2^n$$

$$(1+x)^n = 1 + nx + {}^n C_2 x^2 + \dots$$

$$x=1,$$

$$\underline{(1+1)^n} = {}^n C_0 + {}^n C_1 + {}^n C_2 + \dots + {}^n C_n$$



Q) What is the arithmetic mean of the series

$${}^n C_0, {}^n C_1, \dots, {}^n C_n, ?$$

(a)  $\frac{2^n}{n}$

(b)  $\frac{2^n}{(n+1)}$

(c)  $\frac{2^{(n+1)}}{n}$

(d)  $\frac{2^{(n+1)}}{(n+1)}$

Ans: (b)

Q) In a test in Mathematics, 20% of the students obtained “first class”. If the data are represented by a pie chart, what is the central angle corresponding to “first class”?

(a)  $20^\circ$

(b)  $36^\circ$

(c)  $72^\circ$

(d)  $144^\circ$

$$\left(\frac{20}{100}\right) = \frac{\text{central angle}}{360^\circ}$$

$$\frac{1}{5} \times 360^\circ = \underline{72^\circ}$$

$$\frac{\text{part}}{\text{whole}} \times 360^\circ$$

central angle  
of that part

- Q) In a test in Mathematics, 20% of the students obtained “first class”. If the data are represented by a pie chart, what is the central angle corresponding to “first class”?
- (a)  $20^\circ$                       (b)  $36^\circ$                       (c)  $72^\circ$                       (d)  $144^\circ$

**Ans: (c)**

Q) The mean and standard deviation of a set of values are 5 and 2 respectively. If 5 is added to each value, then what is the coefficient of variation for the new set of values?

(a) 10

(b) 20

(c) 40

(d) 70

$$\text{coefficient of variation} = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

$$SD(X) = m$$

$$= \frac{2}{5+5} \times 100 = \frac{2}{10} \times 100 = \underline{\underline{20}}$$

$$SD(X \pm k) = m$$

$$SD(kX) = \underline{\underline{km}}$$

Q) The mean and standard deviation of a set of values are 5 and 2 respectively. If 5 is added to each value, then what is the coefficient of variation for the new set of values?

(a) 10

(b) 20

(c) 40

(d) 70

Ans: (b)

Q) If two variables  $X$  and  $Y$  are independent, then what is the correlation coefficient between them?

- (a) 1                                      (b) -1  
(c) 0                                        (d) None of these

$r = 0 \Rightarrow X$  and  $Y$  are independent.

Q) If two variables  $X$  and  $Y$  are independent, then what is the correlation coefficient between them?

- (a) 1                                      (b)  $-1$   
(c) 0                                        (d) None of these

**Ans: (c)**

Q) The variance of 25 observations is 4. If 2 is added to each observation, then the new variance of the resulting observations is

(a) 2

(b) 4

(c) 6

(d) 8

$$\begin{array}{l} \text{Var}(X) = m \\ \text{Var}(X + k) = m \end{array} \quad \begin{array}{l} \text{no change} \\ \text{---} \end{array}$$



Q) The variance of 25 observations is 4. If 2 is added to each observation, then the new variance of the resulting observations is

- (a) 2                      (b) 4                      (c) 6                      (d) 8

**Ans: (b)**

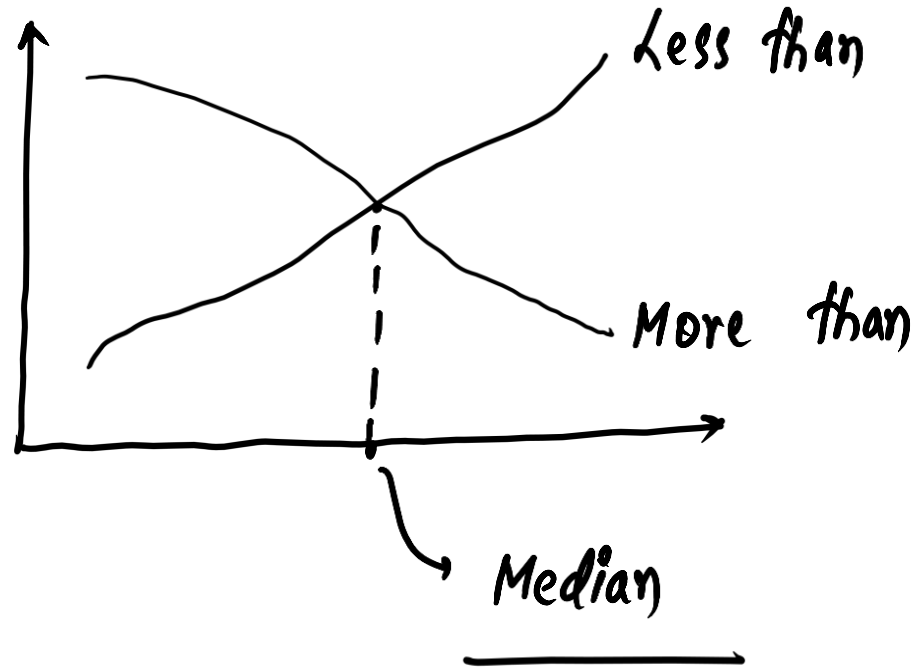
Q) Which one of the following can be obtained from an ogive?

(a) Mean

(b) Median

(c) Geometric Mean

(d) Mode



Q) Which one of the following can be obtained from an ogive?

(a) Mean

(b) Median

(c) Geometric Mean

(d) Mode

**Ans: (b)**

Q) The marks scored by two students A and B in six subjects are given below:

A	71	56	45	89	54	44
B	55	74	83	54	38	52

Which one of the following statements is correct ?

- (a) The average scores of A and B are same but A is consistent
- (b) The average scores of A and B are not same but A is consistent
- (c) The average scores of A and B are same but B is consistent
- (d) The average scores of A and B are not same but B is consistent

Q) The marks scored by two students A and B in six subjects are given below:

A	71	56	45	89	54	44
B	55	74	83	54	38	52

Which one of the following statements is correct ?

- (a) The average scores of A and B are same but A is consistent
- (b) The average scores of A and B are not same but A is consistent
- (c) The average scores of A and B are same but B is consistent
- (d) The average scores of A and B are not same but B is consistent

**Ans: (d)**

Q) If the slopes of the line of regression of Y <sup>on</sup> X and of X <sup>on</sup> Y are  $30^\circ$  and  $60^\circ$  respectively, then  $r(X, Y)$  is :

(a)  $-1$

(b)  $1$

(c)  $\frac{1}{\sqrt{3}}$

(d)  $-\frac{1}{\sqrt{3}}$

**Q)** If the slopes of the line of regression of Y and X and of X and Y are  $30^\circ$  and  $60^\circ$  respectively, then  $r(X, Y)$  is :

(a)  $-1$

(b)  $1$

(c)  $\frac{1}{\sqrt{3}}$

(d)  $-\frac{1}{\sqrt{3}}$

**Ans: (c)**

Q) In computing a measure of the central tendency for any set of 51 numbers, which one of the following measures is well-defined but uses only very few of the numbers of the set?

- (a) Arithmetic mean
- (b) Geometric mean
- (c) Median
- (d) Mode



Q) In computing a measure of the central tendency for any set of 51 numbers, which one of the following measures is well-defined but uses only very few of the numbers of the set?

- (a) Arithmetic mean                      (b) Geometric mean  
(c) Median                                      (d) Mode

**Ans: (d)**

**Q)** The data below record the itemwise quarterly expenditure of a private organization :

<b>Item of expenditure</b>	<b>Amount (in lakh rupees)</b>
1. Salaries	6.0 —
2. TA & DA	4.9
3. House rent and postage	3.6
4. All other expenses	5.5
Total :	<u>20.0</u>

The data is represented by a pie diagram. What is the sectorial angle of the sector with largest area?

- (a)  $120^\circ$                       (b)  $108^\circ$   
(c)  $100^\circ$                         (d)  $90^\circ$

**Q)** The data below record the itemwise quarterly expenditure of a private organization :

Item of expenditure	Amount (in lakh rupees)
1. Salaries	6.0
2. TA & DA	4.9
3. House rent and postage	3.6
4. All other expenses	5.5
Total :	<u>20.0</u>

The data is represented by a pie diagram. What is the sectorial angle of the sector with largest area?

- (a)  $120^\circ$                       (b)  $108^\circ$   
(c)  $100^\circ$                       (d)  $90^\circ$

**Ans: (b)**



Q) Consider the two series of observations A and B as follows:

Series A	1019	1008	1015	1006	1002
Series B	1.9	0.8	1.5	0.6	0.2

If the standard deviation of the Series A is  $\sqrt{38}$ , then what is the standard deviation of the Series B?

- (a) 3.8                                      (b)  $\sqrt{0.38}$   
(c) 0.38                                      (d)  $\sqrt{38}$

**Ans: (b)**

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# MCQS

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