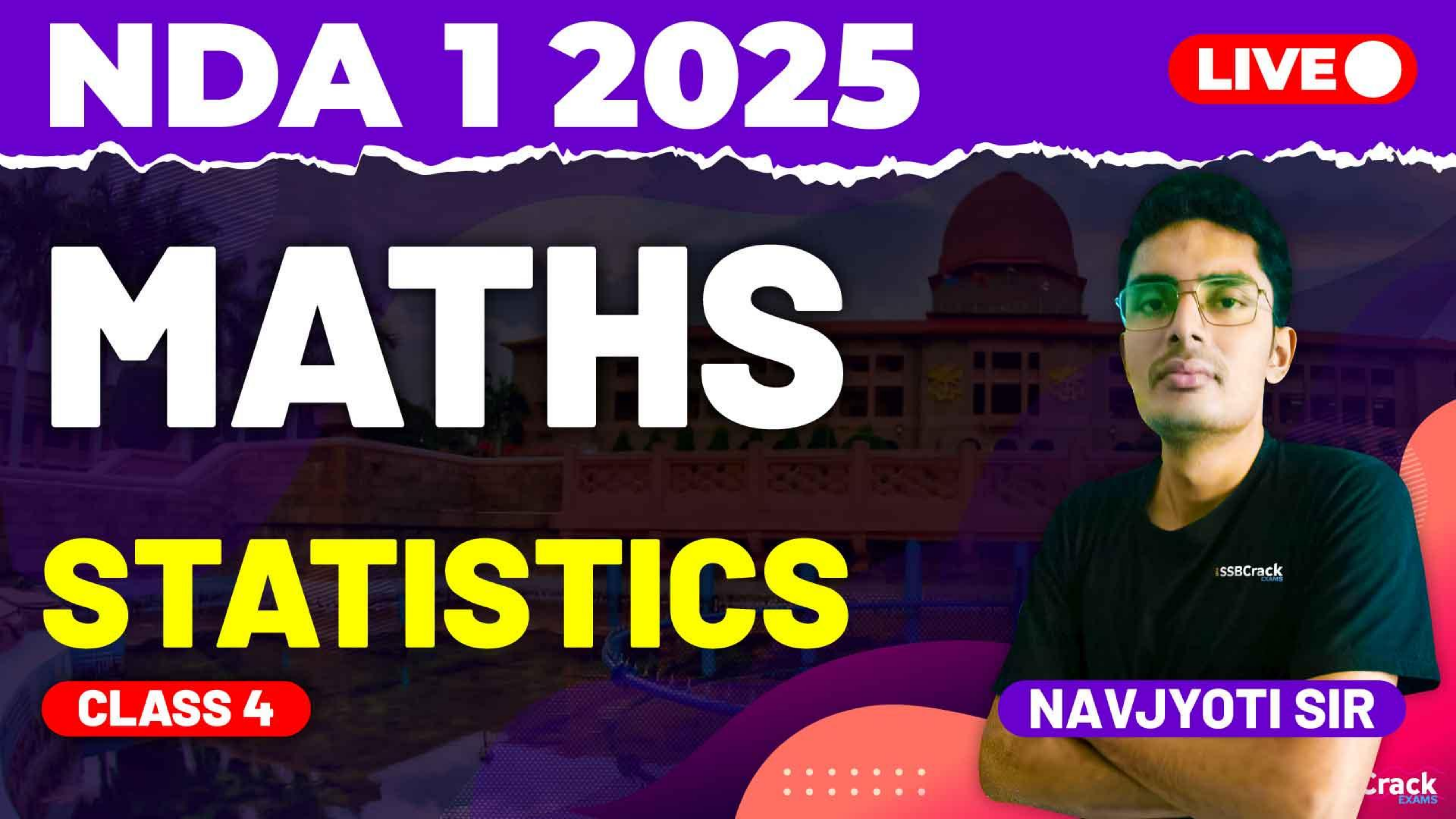
NDA 1 2025
LIVE
MATHS
STATISTICS
CLASS 4
NAVJYOTI SIR
SSBCrack

Let $x-3y+4=0$ and $2x-7y+8=0$ be two lines of regression computed from some bivariate data. If b_{yx} and b_{xy} are regression coefficients of lines of regression of y on x and x on y respectively, then what is the value of $b_{xy}+7b_{yx}$?

(a) –2

(b) 1

(c) 2

(d) 5

$x - 3y + 4 = 0$

$\frac{1}{3}$

3

$2x - 7y + 8 = 0$

$\frac{7}{2}$

$\frac{2}{7}$ (b_{yx})

$b_{xy} + 7b_{yx} = 3 + 7\left(\frac{2}{7}\right) = 3 + 2 = 5$

Let $x - 3y + 4 = 0$ and $2x - 7y + 8 = 0$ be two lines of regression computed from some bivariate data. If b_{yx} and b_{xy} are regression coefficients of lines of regression of y on x and x on y respectively, then what is the value of $b_{xy} + 7b_{yx}$?

(a) -2

(b) 1

(c) 2

(d) 5

Ans: (d)

The mean of n observations

$$1, 4, 9, 16, \cdots, n^2$$

is 130. What is the value of n?

(a) 18

(b) 19

(c) 20

(d) 21

$$\frac{1+4+9 \cdots n^2}{n} = 130$$

$$\frac{\frac{\cancel{n}(n+1)(2n+1)}{6}}{\cancel{n}} = 130$$

$$(n+1)(2n+1) = 780$$

(a) 19×37

(b) $20 \times 39 = 780$

780 | 13×60 — 20×39

78×10

26×30

The mean of n observations

$$1, 4, 9, 16, \cdots, n^2$$

is 130. What is the value of n?

(a) 18

(b) 19

(c) 20

(d) 21

Ans: (b)

What is the mean deviation of the first 10 natural numbers?

(a) 2

(b) 2·5

(c) 3

(d) 3·5

$$\text{Mean} = \frac{1+2+3+4+5+6+7+8+9+10}{10}$$

$$= \frac{\frac{10 \times 11}{2}}{10} = \frac{55}{10} = \underbrace{5.5}$$

$$1+2+3+\dots n = \frac{n(n+1)}{2}$$

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

positive value

$$\text{Mean deviation} = \frac{4.5+3.5+2.5+1.5+0.5+0.5+1.5+2.5+3.5+4.5}{10}$$

$$= \frac{2(4.5+3.5+2.5+1.5+0.5)}{10} = \frac{2 \times 12.5}{10} = \frac{25}{10} = 2.5$$

What is the mean deviation of the first 10 natural numbers?

(a) 2

(b) 2·5

(c) 3

(d) 3·5

Ans: (b)

Let $\sum_{i=1}^{9} x_i^2 = 855$. If M is the mean and σ is the standard deviation of $x_1, x_2, \cdots, x_9$, then what is the value of $M^2 + \sigma^2$?

(a) 100

(b) 95

(c) 90

(d) 85

$$\sigma^2 = \frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2$$

$$\sigma^2 = \frac{855}{9} - M^2$$

$$\sigma^2 + M^2 = \frac{855}{9} = 95$$

Let $\sum_{i=1}^{9} x_i^2 = 855$. If M is the mean and σ is the standard deviation of $x_1, x_2, \cdots, x_9$, then what is the value of $M^2 + \sigma^2$?

(a) 100

(b) 95

(c) 90

(d) 85

Ans: (b)

The mean of the series $x_1, x_2, \cdots, x_n$ is $\bar{x}$. If x_n is replaced by k, then what is the new mean?

(a) $\bar{x} - x_n + k$

(b) $\dfrac{n\bar{x} - \bar{x} + k}{n}$

(c) $\dfrac{\bar{x} - x_n - k}{n}$

(d) $\dfrac{n\bar{x} - x_n + k}{n}$

$$\frac{x_1 + x_2 + \cdots x_n}{n} = \bar{x}$$

$$\text{New mean} = \frac{(x_1 + x_2 + \cdots x_n) - x_n + k}{n}$$

$$\text{New mean} = \frac{n\bar{x} - x_n + k}{n}$$

The mean of the series $x_1, x_2, \cdots, x_n$ is $\bar{x}$. If x_n is replaced by k, then what is the new mean?

(a) $\bar{x} - x_n + k$

(b) $\dfrac{n\bar{x} - \bar{x} + k}{n}$

(c) $\dfrac{\bar{x} - x_n - k}{n}$

(d) $\dfrac{n\bar{x} - x_n + k}{n}$

Ans: (d)

SSBCrack EXAMS

Q) It is given that $\overline{X}=10$, $\overline{Y}=90$, $\sigma_X=3$, $\sigma_Y=12$ and $r_{XY}=0.8$. The regression equation of X on Y is

(a) $Y=3.2X+58$ (b) $X=3.2Y+58$

(c) $X=-8+0.2Y$ (d) $Y=-8+0.2X$

passing point $=(\bar{x}, \bar{y})$

$$x-\bar{x} = r\frac{\sigma_x}{\sigma_y}(y-\bar{y})$$

slope $= r\dfrac{\sigma_x}{\sigma_y}$

$$x-10 = 0.8\left(\frac{3}{12}\right)(y-90)$$

$$x-10 = 0.2(y-90) \Rightarrow x-0.2y+8=0 \Rightarrow x = 0.2y-8$$

Q) It is given that $\overline{X} = 10$, $\overline{Y} = 90$, $\sigma_X = 3$, $\sigma_Y = 12$ and $r_{XY} = 0.8$. The regression equation of X on Y is

(a) $Y = 3.2X + 58$
(b) $X = 3.2Y + 58$
(c) $X = -8 + 0.2Y$
(d) $Y = -8 + 0.2X$

Ans: (c)

Q) Consider the following statements:

1. If the correlation coefficient $r_{xy} = 0$, then the two lines of regression are parallel to each other.
2. If the correlation coefficient $r_{xy} = +1$, then the two lines of regression are perpendicular to each other.

Which of the above statements is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

If $r_{xy} = 0 \Rightarrow \tan\theta = \infty \Rightarrow$ lines are perpendicular;

$r_{xy} = +1 \Rightarrow \tan\theta = 0 \Rightarrow$ lines are parallel,

Q) Consider the following statements:

1. If the correlation coefficient $r_{xy} = 0$, then the two lines of regression are parallel to each other.
2. If the correlation coefficient $r_{xy} = +1$, then the two lines of regression are perpendicular to each other.

Which of the above statements is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

Ans: (d)

Q) If $4x - 5y + 33 = 0$ and $20x - 9y = 107$ are two lines of regression, then what are the values of $\bar{x}$ and $\bar{y}$ respectively?

(a) 12 and 18 (b) 18 and 12

(c) 13 and 17 (d) 17 and 13

$(\bar{x}, \bar{y})$ is the passing point for both lines.

So, intersection point of the two lines will give values of $\bar{x}$ and $\bar{y}$.

$4x - 5y = -33$ —— $\times 5$

$20x - 9y = 107$

$$\begin{array}{rcl} 20x - 25y &=& -165 \\ 20x - 9y &=& 107 \\ (-) \quad (+) & & (-) \\ \hline -16y &=& -272 \end{array}$$

$y = 17 \Rightarrow \bar{y} = 17$

Q) If $4x - 5y + 33 = 0$ and $20x - 9y = 107$ are two lines of regression, then what are the values of $\bar{x}$ and $\bar{y}$ respectively?

(a) 12 and 18
(b) 18 and 12
(c) 13 and 17
(d) 17 and 13

Ans: (c)

Q) The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 2, then the median of the new set

(a) remains the same as that of the original set

(b) is increased by 2

(c) is decreased by 2

(d) is two times the original median.

$x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \quad x_6 \quad x_7 \quad x_8 \quad x_9$

$\equiv$ Median

Largest four observations

Q) The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 2, then the median of the new set

(a) remains the same as that of the original set

(b) is increased by 2

(c) is decreased by 2

(d) is two times the original median.

Ans: (a)

Q) Consider the following statements :

(A) Mode can be computed from histogram ✓

(B) Median is not independent of change of scale ✓

(C) Variance is independent of change of origin and scale.

Which of these is / are correct ?

(a) (A), (B) and (C)
(b) only (B)
(c) only (A) and (B)
(d) only (A)

multiplying each observation

not independent of change of scale ;

Q) Consider the following statements :

(A) Mode can be computed from histogram

(B) Median is not independent of change of scale

(C) Variance is independent of change of origin and scale.

Which of these is / are correct ?

(a) (A), (B) and (C)
(b) only (B)
(c) only (A) and (B)
(d) only (A)

Ans: (c)

Q) In a series of 2 n observations, half of them equal a and remaining half equal $-a$. If the standard deviation of the observations is 2, then $|a|$ equals.

(a) $\frac{\sqrt{2}}{n}$ (b) $\sqrt{2}$

(c) 2 (d) $\frac{1}{n}$

$$\underbrace{a \ldots a}_{n} \quad \underbrace{-a \ldots -a}_{n}$$

$$\text{Mean} = \frac{0}{2n} = 0$$

$$SD = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}}$$

$$2 = \sqrt{\frac{\underbrace{(0-a)^2 + \ldots}_{n \text{ times}} + \underbrace{(0+a)^2 + \ldots}_{n \text{ times}}}{2n}}$$

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

$$\boxed{2 = a} \Rightarrow \boxed{|a| = 2}$$

Q) In a series of $2n$ observations, half of them equal a and remaining half equal $-a$. If the standard deviation of the observations is 2, then $|a|$ equals.

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

(b) $\sqrt{2}$

(c) 2

(d) $\frac{1}{n}$

Ans: (c)

Q) The arithmetic mean of 1, 8, 27, 64,..... up to n terms is given by

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

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

(c) $\frac{n(n+1)^2}{4}$

(d) $\frac{n^2(n+1)^2}{4}$

$1^3, 2^3, 3^3, 4^3 \ldots n^3$

$$\text{Mean} = \frac{1^3 + 2^3 + \ldots n^3}{n} = \frac{\frac{\cancel{n^2}(n+1)^2}{4}}{\cancel{n}} = \frac{n(n+1)^2}{4}$$

Q) The arithmetic mean of 1, 8, 27, 64,..... up to n terms is given by

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

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

(c) $\frac{n(n+1)^2}{4}$

(d) $\frac{n^2(n+1)^2}{4}$

Ans: (c)

Q) The mean of the numbers a, b, 8, 5, 10 is 6 and the variance is 6.80. Then which one of the following gives possible values of a and b ?

(a) $a=0, b=7$ (b) $a=5, b=2$

(c) $a=1, b=6$ (d) $a=3, b=4$

$$\frac{a+b+8+5+10}{5} = 6$$

$$\boxed{a+b=7}$$

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

$$34.00 = 36+a^2-12a+36+b^2-12b+4+1+16$$

$$34 = 93+a^2-12a+b^2-12b$$

$$a^2-12a+b^2-12b = -59$$

$$a^2 - 12a + b^2 - 12b = -59$$

(a) $0, 7$ $\quad$ $LHS = 0 - 0 + 49 - 84 = \underline{-45}$

(b) $5, 2$ $\quad$ $LHS = 25 - 60 + 4 - 48$

$= -35 - 44$ ✗

$= -89$ ✗

(c) $1, 6$

$1 - 12 + 36 - 72 = -11 - 36 = -47$

(d) $3, 4$ ✓ $\quad$ $9 - 36 + 16 - 48 = -27 - 32 = -59$

SSBCrack EXAMS

Q) The mean of the numbers a, b, 8, 5, 10 is 6 and the variance is 6.80. Then which one of the following gives possible values of a and b ?

(a) $a=0, b=7$

(b) $a=5, b=2$

(c) $a=1, b=6$

(d) $a=3, b=4$

Ans: (d)

Q) In a study on the relationship between investment (X) and profit (Y), the following two regression equations were obtained based on the data on X and Y

$3X + Y - 12 = 0$

$X + 2Y - 14 = 0$

What is the mean $\overline{X}$?

(a) 6 (b) 5

(c) 4 (d) 2

HW

Q) In a study on the relationship between investment (X) and profit (Y), the following two regression equations were obtained based on the data on X and Y

$$3X + Y - 12 = 0$$

$$X + 2Y - 14 = 0$$

What is the mean $\overline{X}$?

(a) 6 (b) 5

(c) 4 (d) 2

Ans: (d)

Q) If the mean deviation of the numbers 1, 1 + d, 1 + 2d, ... 1 + 100*d* from their mean is 255, then *d* is equal to :

(a) 20.0 (b) 10.1 (c) 20.2 (d) 10.0

$1, 1+d, 1+2d + \dots\dots 1+100d$

$$\text{Mean} = \frac{1 + (1+d) + (1+2d) + \dots (1+100d)}{101}$$

$$= \frac{(1+1+\dots 101 \text{ times}) + d(1+2+3\dots 100)}{101} = \frac{101 + d\frac{(100)(101)}{2}}{101}$$

$$\frac{101 + d\left(\frac{(100)(101)}{2}\right)}{101} = \frac{1 + 50d}{}$$

$$\text{Mean deviation} = \frac{50d + 49d + 48d \ldots\ldots 0 + d + 2d + 3d \ldots\ldots 50d}{101}$$

$$255 = \frac{2(d + 2d \ldots 50d)}{101} = \frac{2d(1+2+3 \ldots 50)}{101} = \frac{2d\,\frac{(50)(51)}{2}}{101} = 255$$

$$\frac{2d\,\frac{(50)(51)}{2}}{101} = 255$$

$$d = \frac{\overset{5}{\cancel{255}} \times 101}{\underset{10}{\cancel{50}} \times \cancel{51}} = \frac{101}{10} = 10.1$$

$$\boxed{d = 10.1}$$

Q) If the mean deviation of the numbers 1, 1 + d, 1 + 2d, ... $1 + 100d$ from their mean is 255, then d is equal to :

(a) 20.0 (b) 10.1 (c) 20.2 (d) 10.0

Ans: (b)

Q) Consider the following statements in respect of histogram :

1. The histogram is a suitable representation of a frequency distribution of a continuous variable. ✓

class intervals

2. The area included under the whole histogram is the total frequency.

Area $\neq$ Total frequency

directly related,

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Q) Consider the following statements in respect of histogram :

1. The histogram is a suitable representation of a frequency distribution of a continuous variable.
2. The area included under the whole histogram is the total frequency.

Which of the above statements is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans: (a)

Q) The mean of the data set comprising of 16 observations is 16. If one of the observation valued 16 is deleted and three new observations valued 3, 4 and 5 are added to the data, then the mean of the resultant data, is:

(a) 15.8 (b) 14.0 (c) 16.8 (d) 16.0

$$\frac{(16 \times 16) - 16 + 3 + 4 + 5}{18} = \frac{256 - 16 + 12}{18} = \frac{252}{18} = 14$$

Q) The mean of the data set comprising of 16 observations is 16. If one of the observation valued 16 is deleted and three new observations valued 3, 4 and 5 are added to the data, then the mean of the resultant data, is:

(a) 15.8 (b) 14.0 (c) 16.8 (d) 16.0

Ans: (b)

Q) If the standard deviation of the numbers 2, 3, a and 11 is 3.5, then which of the following is true?

(a) $3a^2 - 34a + 91 = 0$ (b) $3a^2 - 23a + 44 = 0$

(c) $3a^2 - 26a + 55 = 0$ (d) $3a^2 - 32a + 84 = 0$

Mean $(\bar{x}) = \dfrac{2+3+a+11}{4} = \dfrac{16+a}{4} = 4 + \dfrac{a}{4}$

Standard deviation $= \sqrt{\dfrac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{\dfrac{\sum x_i^2}{n} - \left(\dfrac{\sum x_i}{n}\right)^2}$

$= \sqrt{\dfrac{2^2+3^2+a^2+11^2}{4} - (\bar{x})^2}$

$$\frac{2^2+3^2+a^2+11^2}{4} - (\bar{x})^2 = (3.5)^2$$

$$\frac{a^2+134}{4} - \left(4+\frac{a}{4}\right)^2 = (3.5)^2$$

$$(3+0.5)^2$$

$$\frac{9+0.25+3}{12.25}$$

$$\frac{a^2}{4} + 33.5 - 16 - \frac{a^2}{16} - 2a = 12.25$$

$$\begin{array}{r} 33.50 \\ 28.25 \\ \hline 5.25 \end{array}$$

$$\frac{3a^2}{16} - 2a = 16 + 12.25 - 33.5$$

$$\frac{3a^2 - 32a}{16} = -5.25 \Rightarrow 3a^2 - 32a + 84 = 0$$

$$(3a^2 - 32a + 84 = 0)$$

Q) If the standard deviation of the numbers 2, 3, a and 11 is 3.5, then which of the following is true?

(a) $3a^2 - 34a + 91 = 0$

(b) $3a^2 - 23a + 44 = 0$

(c) $3a^2 - 26a + 55 = 0$

(d) $3a^2 - 32a + 84 = 0$

Ans: (d)

Q) The regression lines will be perpendicular to each other if the coefficient of correlation r is equal to

(a) 1 only (b) 1 or –1

(c) –1 only (d) 0

$r = 0 \Rightarrow$ regression lines are perpendicular,

$\left(\tan\theta = \frac{1-r}{r}\right)$

Q) The regression lines will be perpendicular to each other if the coefficient of correlation r is equal to

(a) 1 only
(b) 1 or -1
(c) -1 only
(d) 0

Ans: (d)