NDA 1 2025

LIVE

MATHS

STATISTICS

CLASS 3

NAVJYOTI SIR

Crack
EXAMS

. 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 λ ?

(a) 3

(b) 5

(c) 23

(d) 25

$np = 5$

$npq = 4$

$\frac{1}{q} = \frac{5}{4}$

$q = \frac{4}{5}$

$p = 1 - \frac{4}{5} = \frac{1}{5}$ | $np = 5 \Rightarrow n = 25$

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

$5^{23} \cdot {}^{n}C_3 p^3 q^{n-3} = \lambda 4^{\lambda}$

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

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

$4 \times 23 \times 4^{22} = \lambda 4^{\lambda}$

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

$\Rightarrow \lambda = 23$

. 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 λ ?

(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

$y = a + bx$ $\quad \Sigma x = 0$

x	y	xy	x^2
-4	1	-4	16
-1	2	-2	1
2	7	14	4
3	1	3	9
		$\Sigma xy = 11$	$\Sigma x^2 = 30$

$n = 4$ (no. of observations)

b_{yx} (regression coefficient)

$$b_{yx} = \frac{\Sigma xy - \Sigma x \Sigma y}{\Sigma x^2 - (\Sigma x)^2} = \frac{11 - 0}{30 - 0^2} = \left(\frac{11}{30}\right)$$

(b)

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

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

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

$$= \frac{11}{2} + \frac{11}{2} = 11$$

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 θ is the acute angle between them, then what is the value of $488\tan 3\theta$?

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

$x + 2y + 1 = 0$

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

$2x + 3y + 4 = 0$

$2x = -3y - 4$

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

$$\tan\theta = \left| \frac{m_1 - m_2}{1 + m_1 m_2} \right| = \frac{-\frac{1}{2} + \frac{2}{3}}{1 + \frac{1}{3}} = \frac{1}{6} \times \frac{3}{4} = \frac{1}{8}$$

$$488\tan 3\theta = 488\left(\frac{3\tan\theta - \tan^3\theta}{1 - 3\tan^2\theta}\right)$$

$$\tan\theta = \frac{1}{8}$$

$$= 488\left(\frac{3\left(\frac{1}{8}\right) - \frac{1}{512}}{1 - 3\left(\frac{1}{64}\right)}\right)$$

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

Let $x+2y+1=0$ and $2x+3y+4=0$ are two lines of regression computed from some bivariate data. If θ 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) $\frac{121}{361}$

$n=10$; $p=\frac{1}{2} \Rightarrow q=1-\frac{1}{2}=\frac{1}{2}$

$Var(x) = npq = 10 \times \frac{1}{2} \times \frac{1}{2} = \frac{5}{2}$

$\frac{2X-3Y}{5X+4Y}=4$

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

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

$$y = \frac{18}{19}x$$

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

$$\text{Var}\left(\frac{18}{19}x\right) = \left(\frac{18}{19}\right)^2 \text{Var}(x)$$

$$= \frac{324}{361} \times \frac{5}{2} = \frac{162 \times 5}{361} = \frac{810}{361}$$

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

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

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) $\frac{121}{361}$

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

$$\frac{150 + 200 + 250 + 300}{4}$$

$$= \frac{900}{4} = 225 \longrightarrow \text{round off} \longrightarrow 230$$

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(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 ?

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

$n = 2,$

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

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

(b) $\frac{2^3 - 2 - 2}{2} = \frac{8-4}{2} = 2$ ✓

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}	...	$2^{-(n-1)}$

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

$$\text{Mean} = \frac{\Sigma x_i f_i}{\Sigma f_i}$$

$n=2 \Rightarrow \frac{2}{1+2^{-1}} = \frac{2}{1+\frac{1}{2}} = \frac{2\times 2}{3} = \frac{4}{3}$

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

(b) $\frac{2^3-2-2}{2^1} = \frac{8-4}{2} = \frac{4}{2} = 2$ X

(c) $\frac{2^3-2-2}{2^2-1} = \frac{4}{3}$ ✓

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: B

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

mean for largest 5 observations and not for all 10.

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

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

47 32 35 50 41

41

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

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

47 32 35 50 41

41

$$\frac{6^2 + 9^2 + 6^2 + 9^2 + 0^2}{5} = \frac{162 + 72}{5} = \frac{234}{5}$$

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

$= 46.8$

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
(b) 7
(c) 15
(d) 21

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

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

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

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
(b) 7
(c) 15
(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

independent of change in origin

$Var(X + k) = Var(X)$

$Var(kX) = k^2 Var(X)$

$S.D(X) = m$

$S.D.(kX) = km$

changes with scale,

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
(b) 10
(c) 20
(d) 40

$Var(x) = 5$

$Var(kx) = k^2 Var(x) = 2^2 \times 5 = 20$

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
(b) 10
(c) 20
(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) $\frac{3}{4}$

$30x - 2y - 825 = 0$

$4y - 15x + 410 = 0$

$r = ?$

$r = \sqrt{b_{xy} \times b_{yx}}$

$= \sqrt{\frac{4}{15} \times \frac{1}{15}} = \frac{2}{15}$

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

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

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

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

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

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

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

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

Q) What is the arithmetic mean of the series ${}^{n}C_0, {}^{n}C_1, \ldots\ldots {}^{n}C_n, ?$

(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° (b) 36° (c) 72° (d) 144°

$$\frac{20}{100} = \frac{\text{central angle}}{360^\circ}$$

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

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° (b) 36° (c) 72° (d) 144°

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

$$\frac{\text{Standard Deviation (SD)}}{\text{Mean}} \times 100$$

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

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

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

$Var(x + k) = Var(x)$

↳ independent of change in origin,

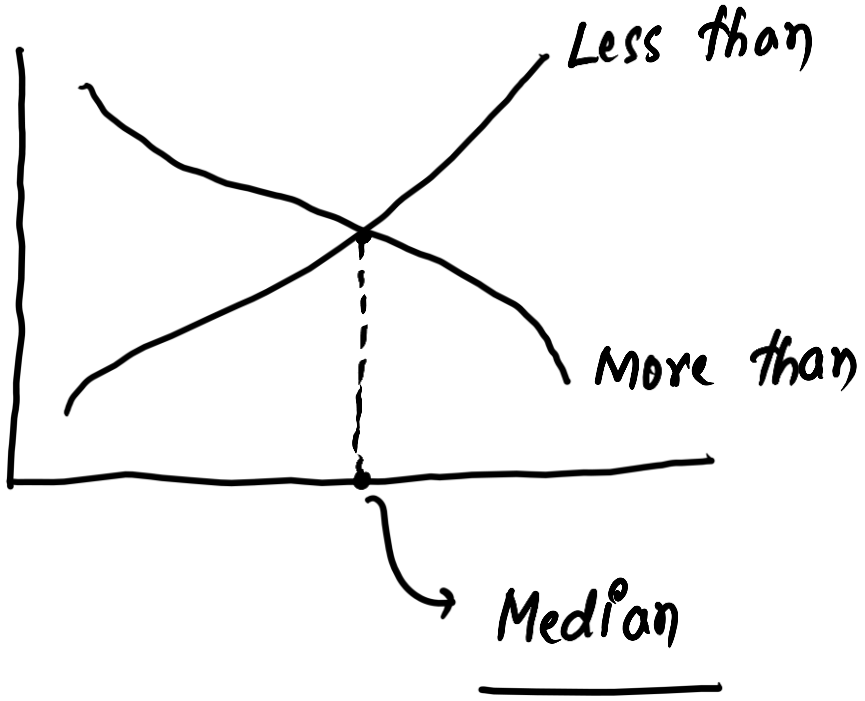
Q) The variance of 25 observations is 4. If 2 is added to each observation, then the new variance of the resulting observations is

(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

consistent → less value of variance / standard deviation.

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(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 ~~and~~ on X and of X ~~and~~ on Y are 30° and 60° respectively, then r(X, Y) is :

(a) -1 (b) 1

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

r → correlation coefficient,

$\tan 30^\circ = \frac{1}{\sqrt{3}} = m_1 = b_{yx}$

$\tan 60^\circ = \sqrt{3} = m_2 = \frac{1}{b_{xy}}$

$b_{xy} = \frac{1}{\sqrt{3}}$

$r = \sqrt{b_{yx} \times b_{xy}} = \sqrt{\frac{1}{\sqrt{3}} \times \frac{1}{\sqrt{3}}} = \frac{1}{\sqrt{3}}$

Q) If the slopes of the line of regression of Y and X and of X and Y are $30°$ and $60°$ 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

only highest observation,

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 :

	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 :	20.0

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

(a) 120° (b) 108°

(c) 100° (d) 90°

highest contribution to total,

$$\frac{6.0}{20.0} \times 360^\circ = \frac{3}{10} \times 360^\circ = 108^\circ$$

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3.	House rent and postage	3.6
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	Total :	20.0

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

(a) 120° (b) 108°

(c) 100° (d) 90°

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

$(\div 10) - 100$

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) $\sqrt{38}$

$Var(kX) = k^2 Var(X)$

$SD(kX) = k\, SD(X)$

$SD(X + k) = SD(X)$

no change

$SD(A) = \sqrt{38}$

$SD\left(\frac{1}{10}A\right) = \frac{1}{10}\sqrt{38} = \sqrt{\frac{38}{100}} = \sqrt{0.38}$

$SD\left(\frac{1}{10}A - 100\right) = SD\left(\frac{1}{10}A\right)$

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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