120

{Most Repeating Questions}

Statistics

→ Statistical Description & Sampling ⇒ Marathon-1

→ Central Tendency & Dispersion ⇒ Chanakya 2.0 & Marathon-1

→ Correlation & Regression ⇒ Chanakya 2.0

→ Index No.

→ Probability

→ Theoretical Distribution

Marathon-2

Statistical Description Of Data

QUESTION

Which of the following statement is true?

(a) Statistics is derived from the French word 'Statistik'. → Germany

(b) Statistics is derived from the Italian word 'Statista'. → Italy

(c) Statistics is derived from the Latin word 'Statistique'. → French

(d) None of these

Status ⇒ Latin

Statista ⇒ Italy

Statistik ⇒ Germany

Statisque ⇒ French

QUESTION

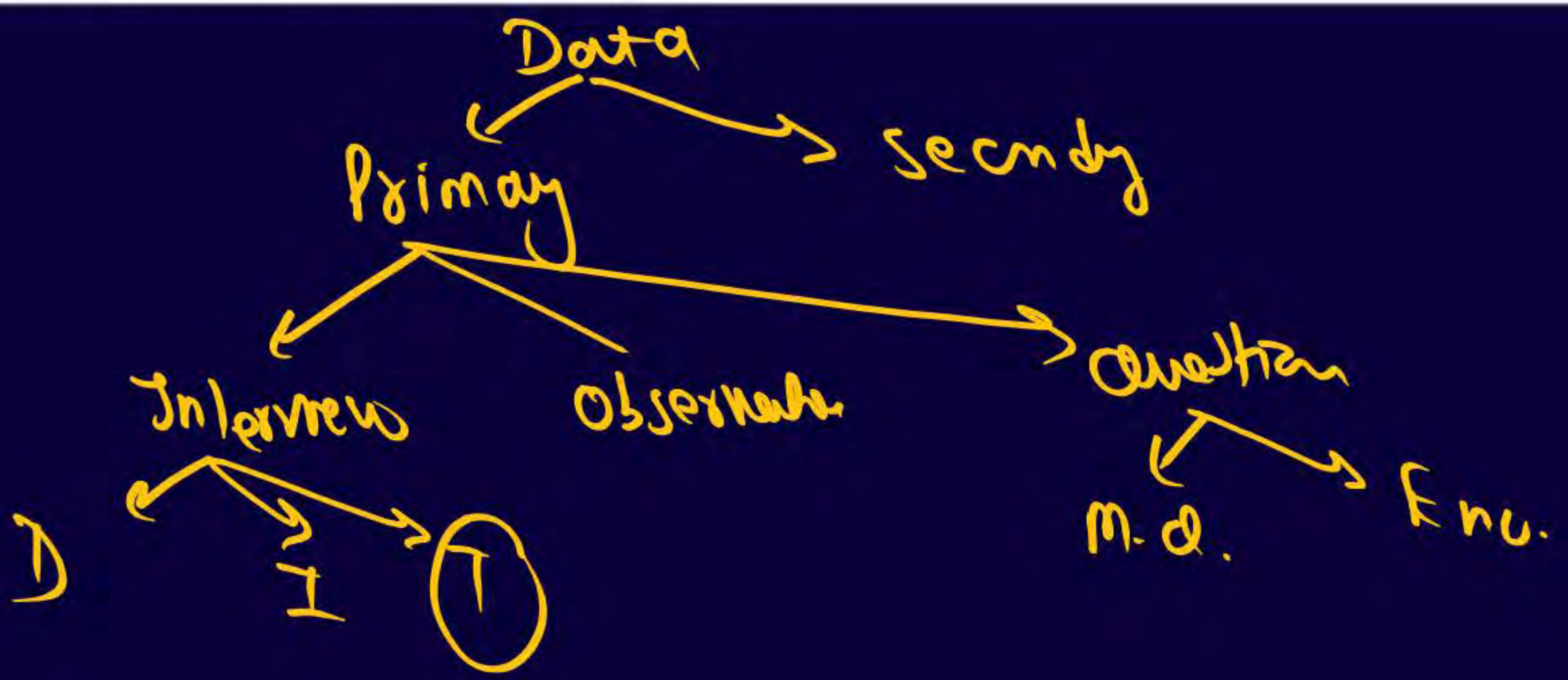
The quickest method to collect primary data is

(a) Personal Interview

(b) Indirect Interview

(c) Mailed Questionnaire Method

(d) Telephonic Interview



QUESTION

The graphical representation of a cumulative frequency distribution is called :

(a) Histogram

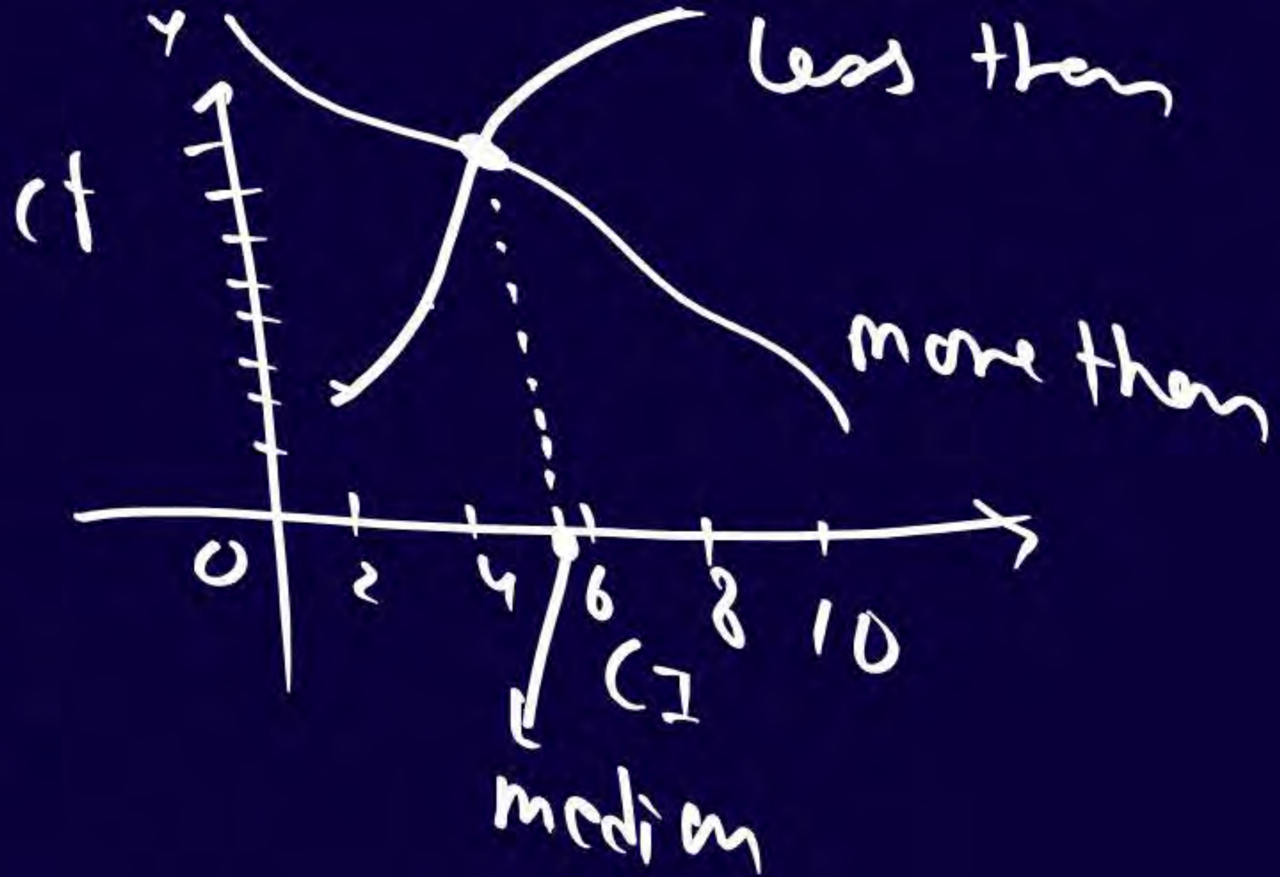
(b) Ogive

(c) Both

(d) None

ogive

CI	fi	cf
0-2	3	3
2-4	2	5
4-6	5	10
6-8	6	16



QUESTION

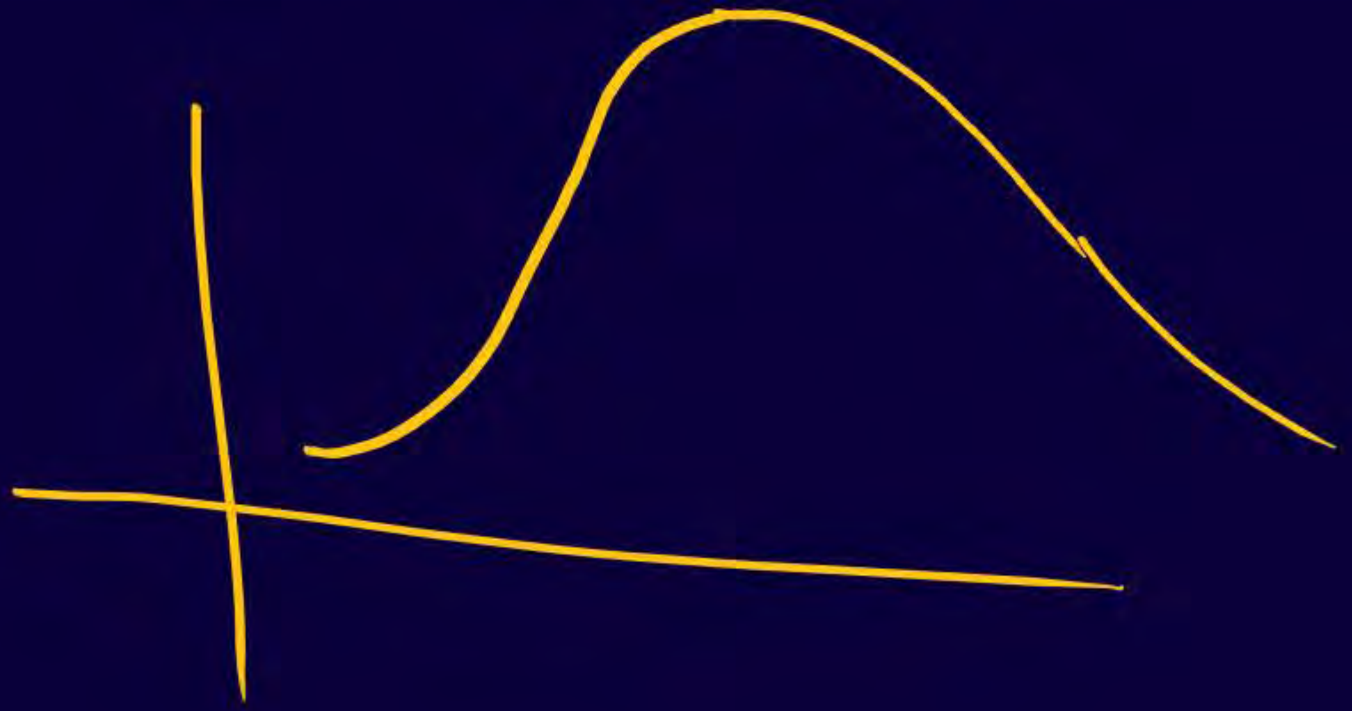
The distribution of profits of a company follows

(a) J - shaped frequency curve

(b) U - shaped frequency curve

(c) Bell - shaped frequency curve

(d) Any of these



QUESTION

Out of 1000 persons, 25 per cent were industrial workers and the rest were agricultural workers. 300 persons enjoyed world cup matches on T.V. 30 per cent of the people who had not watched world cup matches were industrial workers. What is the number of agricultural workers who had enjoyed world cup matches on TV?

(a) 230 (b) 250

(c) 240 (d) 260

1000

25% Industry → 700 × 30% = 210

75% Agri.

	Indust	Agri	
world cup	40	260	300
No worldcup	210	490	700
	250	750	1000

QUESTION

Median of a distribution can be obtained from ;

(a) Histogram

(b) Frequency Polygon

(c) Less than type Ogives

(d) None of these

QUESTION

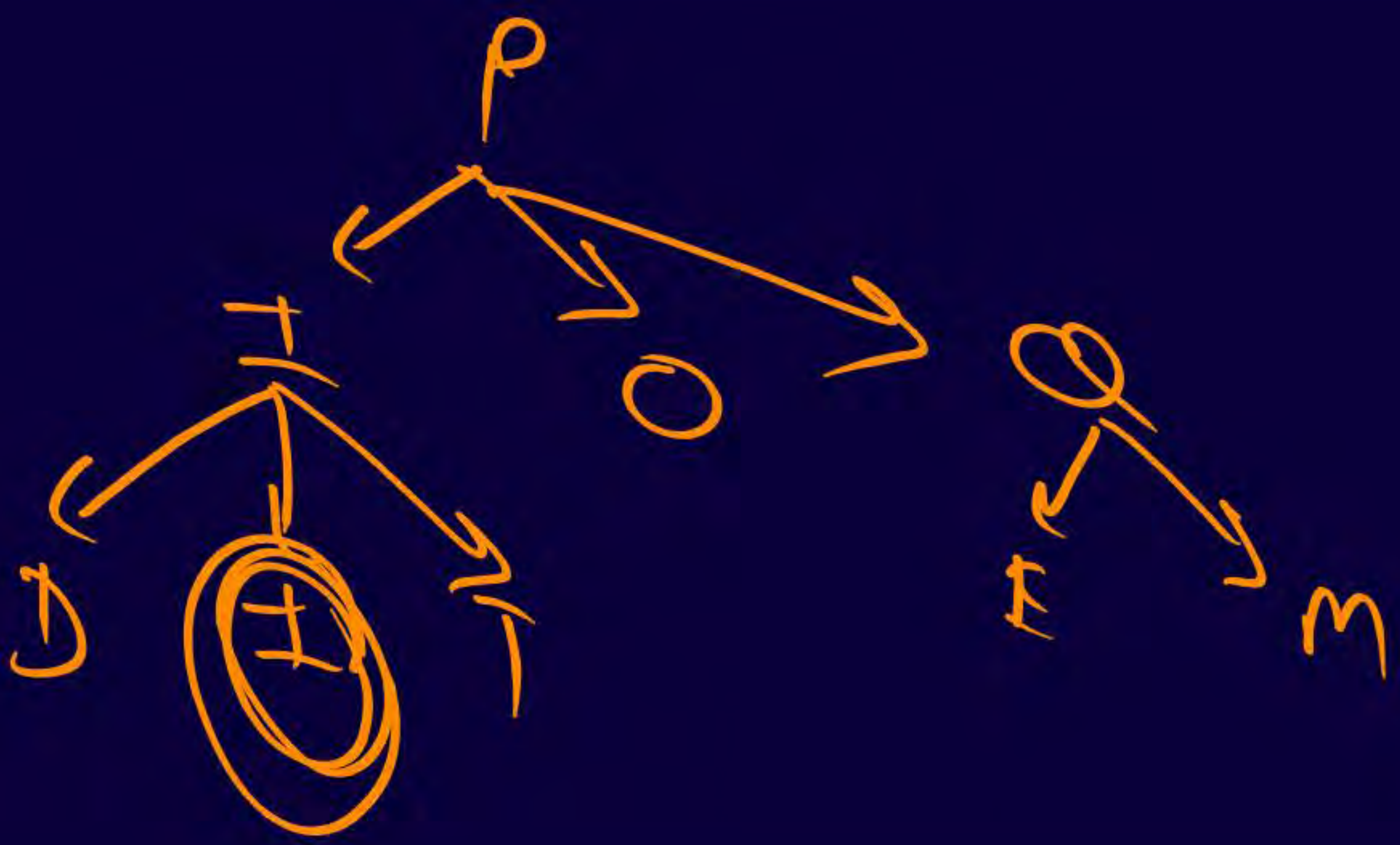
In indirect oral investigation :

(a) Data is not capable of numerical expression

(b) Not possible or desirable to approach informant directly.

(c) Data is collected from the books.

(d) None of these



QUESTION

Circular diagrams are always :

(a) One - dimensional
(b) Two - dimensional
(c) Three - dimensional
(d) Cartograms

→ Line Diagram
→ Bar Diagram

1D

Circle
Rectangle
Square
Histogram

2-D

Cube
Cuboid

3-D

QUESTION

The column headings of a table are known as :

(a) Body (b) Stub

(c) Box - head (d) ~~Caption~~

→ Table no.

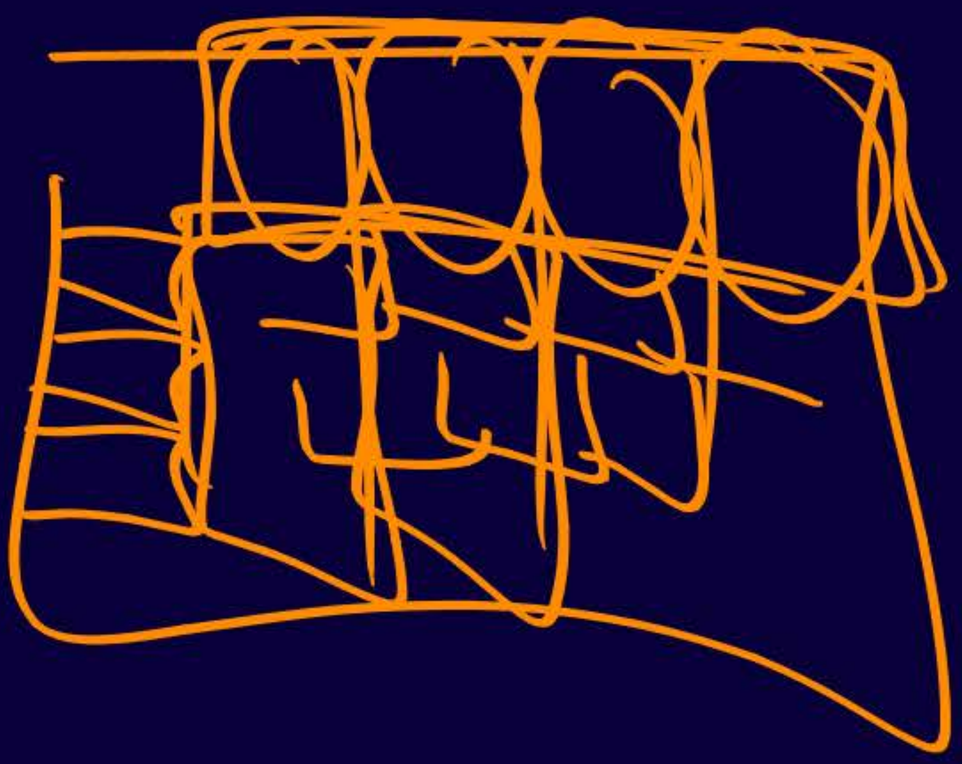
→ Title

→ Head note

→ Captions

→ Stubs

→ Body



QUESTION

The most appropriate diagram to represent the data relating to the monthly expenditure on different items by a family is

(a) Histogram

(b) Pie-diagram.

(c) Frequency polygon

(d) Line graph.

QUESTION

CA

Which of the following is not a two-dimensional figure ?

(a) Line Diagram → 1

(b) Pie Diagram → 2

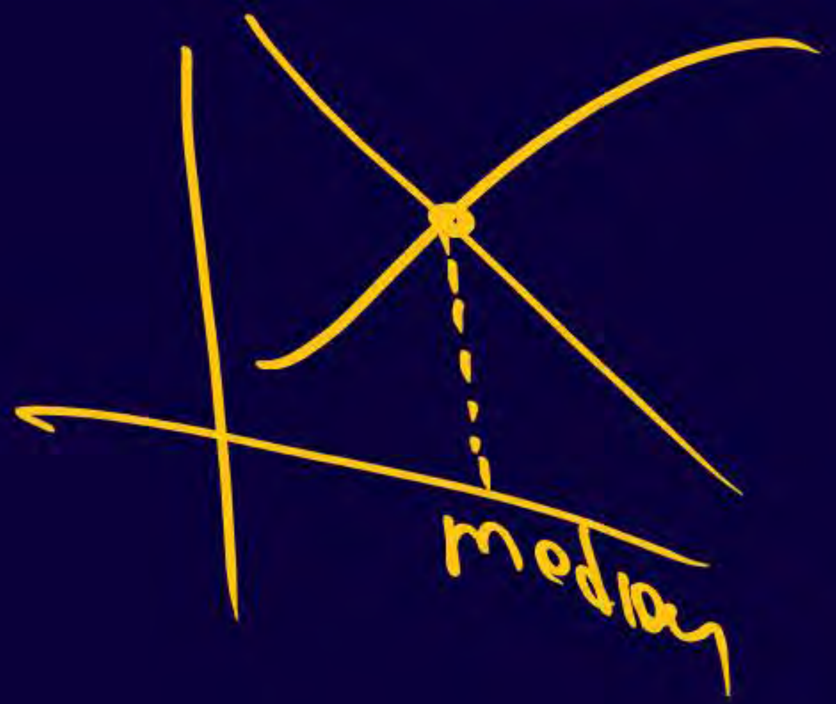
(c) Square Diagram → 2

(d) Rectangle Diagram → 2

QUESTION

Less than type and more than type Ogives meet at a point known as:

(a) Mean
(b) Median
(c) Mode
(d) None



QUESTION

1 3 2

Arrange the dimensions of Bar diagram, Cube diagram, Pie diagram in sequence.

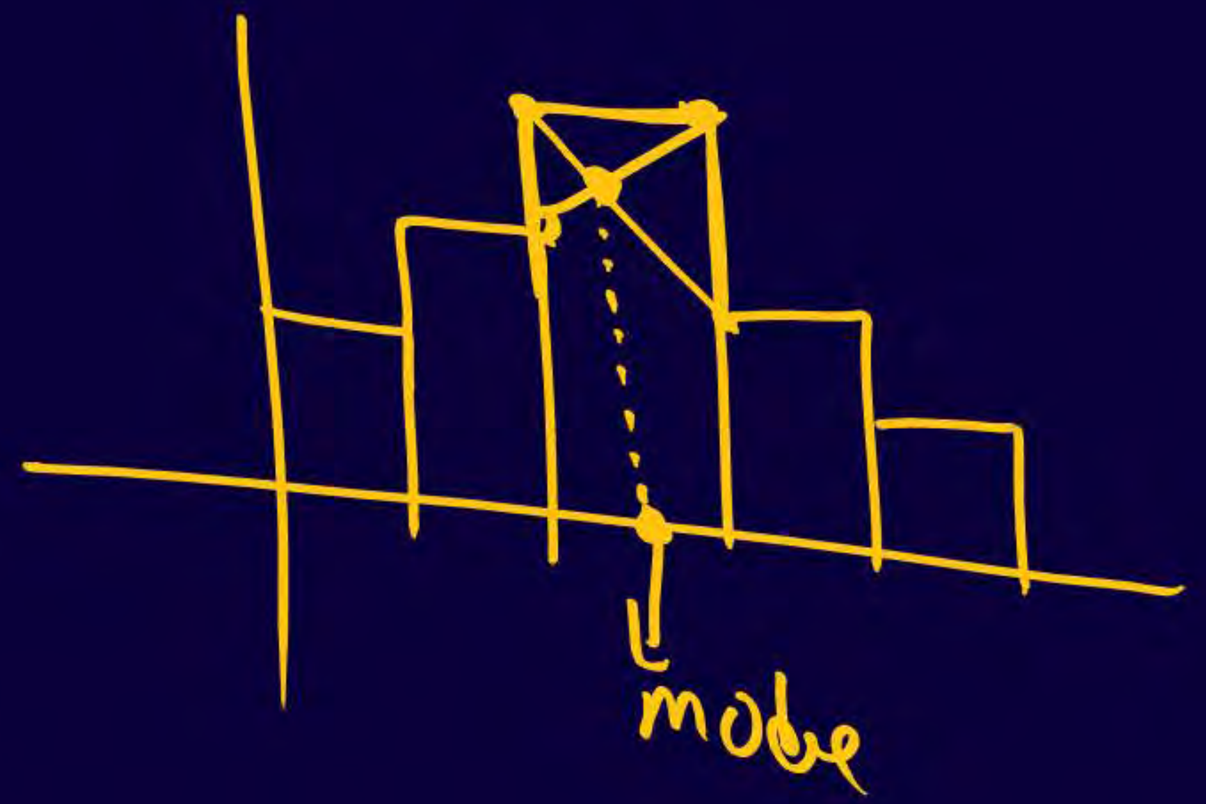
(a) 1, 3, 2
(b) 2, 1, 3
(c) 2, 3, 1
(d) 3, 2, 1

QUESTION

With the help of histogram one can find.

(a) Mean (b) Median

(c) Mode (d) First Quartile



QUESTION

Nationality of a person is :

(a) Discrete variable (b) An attribute

(c) Continuous variable (d) None

Data

Qualitative → Attribute

Quantitative (variable) → Descrete, Continuous

QUESTION

CA

The data obtained by the internet are

(a) Primary data

(b) Secondary data

(c) Both (a) and (b)

(d) None of these.

QUESTION

Frequency Density can be termed as:

(a) Class frequency to the cumulative frequency

(b) Class frequency to the total frequency

(c) Class frequency to the class length

(d) Class length to the class frequency.

CI	f_i	F.D.	R.F.
0-5	2	$\frac{2}{5} = 0.4$	$\frac{2}{6} = 0.33$
5-10	3	$\frac{3}{5} = 0.6$	$\frac{3}{6} = 0.50$
10-15	1	$\frac{1}{5} = 0.2$	$\frac{1}{6} = 0.1667$
	6		

$$\text{Frq. Density} = \frac{\text{class frequency}}{\text{class length}}$$

$$\text{Relative frequency} = \frac{\text{class frequency}}{\text{Total frequency}}$$

QUESTION

The Choronological classification of data are classified on the basis of :

(a) Attributes (b) Area

(c) Time (d) Class Interval

Classification

Qualitative Quantitative Chronological Spatial

Time Location

QUESTION

The frequency of class 20-30 in the following data is

Class	0-10	10-20	20-30	30-40	40-50
Cumulative Frequency	5	13	28	34	38

(a) 5 (b) 28

(c) 15 (d) 13

CI	Cf	fi
0-10	5	5
10-20	13	8
20-30	28	15
30-40	34	6
40-50	38	4
		38

QUESTION

A pie diagram is used to represent the following data:

Source:	Customs	Excise	Income tax	Wealth tax
	$\frac{120}{720} \times 360$	$\frac{180}{720} \times 360$	$\frac{240}{720} \times 360$	$\frac{180}{720} \times 360$
Revenue in million rupees:	120 +	180 +	240 +	180 = 720

The central angles in the pie diagram corresponding to income tax and wealth tax respectively:

(a) (120 , 90) (b) (90 , 120)

(c) (60 , 120) (d) (90 , 60)

QUESTION

The accuracy and consistency of data can be verified by

(a) Scrutiny

(b) Internal Checking

(c) External Checking

(d) Double Checking

QUESTION

Most of the Commonly used distributions provide a.

(a) Bell - Shaped

(b) U Shaped

(c) J - Shaped Curve

(d) Mixed Curve

Normal Curve

Central Tendency & Dispersion

QUESTION

$\Sigma (x_i - ?)^2$ minimum

The sum of the squares of deviations of a set of observations has the smallest value, when the deviations are taken from their :

(a) A . M. (b) H. M.

(c) G. M. (d) None

$\boxed{\Sigma (x_i - \bar{x}) = 0}$

$\Sigma (x_i - A)^2$ is minimum when A = mean

$\Sigma |x_i - A|$ is minimum when A = median

QUESTION

CA

If two variables x and y are related by $2x + 3y - 7 = 0$ and the mean and mean deviation about mean of x are 1 and 0.3 respectively, then the co-efficient of mean deviation of y about mean is :

(a) -5 (b) 4

(c) 12 (d) 50

$\underbrace{2x+3y-7=0}_{\Downarrow}$, $\boxed{\bar{x}=1}$

find y interms of x $\boxed{MD_x = 0.3}$

$3y = -2x + 7$

$y = \underbrace{-\frac{2}{3}}_{\text{scale}} x + \underbrace{\frac{7}{3}}_{\text{origin}}$

	Change of origin	Scale
mean	✓	✓
median	✓	✓
mode	✓	✓
Range	✗	✓
MD	✗	✓
QD	✗	✓
S.D	✗	✓

$$\bar{y} = -\frac{2}{3}\bar{x} + \frac{7}{3} = -\frac{2}{3}(1) + \frac{7}{3} = \frac{5}{3}$$

$$MD \text{ of } y = \left|-\frac{2}{3}\right| \times MD_x = \frac{2}{3} \times 0.3 = 0.2$$

$$\text{coeff. of } MD_y = \frac{MD_y}{\bar{y}} \times 100$$

$$= \frac{0.2}{5/3} \times 100 = 12$$

QUESTION

What is the coefficient of range for the following distribution?

Class Interval:	10-19	20-29	30-39	40-49	50-59
Frequency:	11	25	16	7	3

(a) 22
(b) 50
(c) 75.82
(d) 72.46

S ← 9.5 - 19.5
19.5 - 29.5
29.5 - 39.5
39.5 - 49.5
49.5 - 59.5 → L

$$\text{Coff of Range} = \frac{L - S}{L + S} \times 100$$

$$= \frac{59.5 - 9.5}{59.5 + 9.5} \times 100$$

$$= 72.46$$

QUESTION

For a moderately skewed distribution, which of the following relationship holds ?

(a) Mean – Median = 3 (Median – Mode)

(b) Median – Mode = 3 (Mean – Median)

(c) Mean – Mode = 3 (Mean – Median)

(d) Mean – Median = 3 (Mean – Mode)

3 median = mode + 2 mean

mean - mode = 3 mean - 3 median

3 median = 2 mean + mode

QUESTION

HM & GM

HM & GM

______ & ______ are called ratio averages:

(a) H. M. & G. M.

(b) H. M. & A. M.

(c) A. M. & G. M.

(d) None

QUESTION

Extreme values have ______ effect on mode.

(a) High

(b) low

(c) No

(d) None of these

QUESTION

The best measure of dispersion is:

(a) Q. D.
(b) M. D.
(c) Range
(d) S. D.

QUESTION

Suppose a population A has 100 observations 101, 102, 103, ... 200 and another population B has 100 observations 151, 152, 153, ... 250. If V_A and V_B represents the variance of the two populations respectively, then $V_A / V_B =$:

(a) 9 / 4

(b) 1

(c) 4 / 9

(d) 2 / 3

A	A − 100
101	1
102	2
103	3
⋮	4
200	⋮
	100

$V_A = \frac{100^2 - 1}{12} = \frac{9999}{12}$

B	B − 150
151	1
152	2
153	3
⋮	⋮
250	100

$V_B = \frac{100^2 - 1}{12} = \frac{9999}{12}$

$\frac{V_A}{V_B} = \frac{\frac{9999}{12}}{\frac{9999}{12}} = 1$

S.D of first 'n' natural no $= \sqrt{\dfrac{n^2-1}{12}}$

Variance of first 'n' natural no $= \dfrac{n^2-1}{12}$

QUESTION

If there are two groups with 75 and 65 as harmonic means and containing 15 and 13 observations. then the combined H.M. is given by:

(a) 70
(b) 80
(c) 70.35
(d) 69.48

$H_1 = 75 \quad H_2 = 65$

$N_1 = 15 \quad N_2 = 13$

Combind HM

$$= \frac{N_1 + N_2}{\frac{N_1}{H_1} + \frac{N_2}{H_2}} = \frac{15+13}{\frac{15}{75} + \frac{13}{65}}$$

$$= \frac{28}{\frac{1}{5} + \frac{1}{5}}$$

$$= \frac{28}{0.4}$$

$$= 70$$

QUESTION

If 5 is subtracted from each observation of some certain item then its co-efficient of variation is 10% and if 5 is added to each item then its coefficient of variation is 6%. Find original coefficient of variation.

(a) 8%
(b) 7.5%
(c) 4%
(d) None of these

$CV = \frac{1.5}{20} \times 100 = 7.5\%$

$C.V. = \frac{\sigma}{\bar{x}} \times 100$

$\frac{\sigma}{\bar{x}-5} \times 100 = 10$

$100\sigma = 10\bar{x} - 50$ — (1)

&

$\frac{\sigma}{\bar{x}+5} \times 100 = 6$

$\Rightarrow 100\sigma = 6\bar{x} + 30$ — (2)

Solving (1) & (2)

$10\bar{x} - 50 = 6\bar{x} + 30$

$4\bar{x} = 80$

$\bar{x} = 20$

Now

$100\sigma = 6(20) + 30$

$\sigma = 1.5$

QUESTION

The median of x, $\frac{x}{2}, \frac{x}{3}, \frac{x}{5}$ is 10.

Find x where $x > 0$

(a) 24

(b) 32

(c) 8

(d) 16

$\frac{x}{1}, \frac{x}{2}, \frac{x}{3}, \frac{x}{5}$

$\frac{\frac{x}{2}+\frac{x}{3}}{2}$ = median

$24, \underbrace{12, 8}, 4.8$

$\frac{12+8}{2} = 10$

$\frac{\left(\frac{3x+2x}{6}\right)}{2} = 10$

$\Rightarrow \frac{5x}{6} = 20$

$\Rightarrow x = \frac{120}{5} = 24$

QUESTION

The average salary of 50 men was ₹ 80 but it was found that salary of 2 of them were ₹ 46 and ₹ 28 which was wrongly taken as ₹ 64 and ₹ 82. The revised average salary is :

(a) ₹ 80
(b) ₹ 78.56
(c) ₹ 85.26
(d) ₹ 82.92

(1 mark)

$N = 50$

wrong $\bar{x} = 80$

$\bar{x} = \frac{\Sigma x}{N}$

$80 = \frac{\Sigma x}{50}$

wrong $\Sigma x = 4000$

x_i: 46, 28, $\cancel{64}$, $\cancel{82}$

correct $\Sigma x_i = 4000 - 64 - 82 + 46 + 28$
$= 3928$

correct mean $= \frac{3928}{50} = 78.56$

QUESTION

CA

When mean is 3.57 and mode is 2.13 then the value of median is _______.

(a) 3.09 (b) 5.01

(c) 4.01 (d) None of these

$$3\,\text{median} = \text{mode} + 2\,\text{mean}$$
$$= 2.13 + 2(3.57)$$
$$=$$

$$\text{median} = 3.09$$

QUESTION

CA

The harmonic mean of 1, 1/2, 1/3 .... 1/n is

(a) 1/(n + 1)

(b) 2/(n + 1)

(c) (n + 1)/2

(d) 1/(n – 1)

$$HM = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \frac{1}{x_3} + \cdots + \frac{1}{x_n}}$$

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

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

QUESTION

In a class of 11 students, 3 students were failed in a test. 8 students who passed secured 10, 11, 20, 15, 12, 14, 26 and 24 marks respectively. What will be the median marks of the students :

(a) 12 (b) 15

(c) 13 (d) 13.5

$f_1, f_2, f_3, 10, 11, 12, 14, 15, 20, 24, 26$

median

$$\left(\frac{11+1}{2}\right)^{th} = 6^{th} = 12$$

QUESTION

A lady travel at a speed of 20km/h and returned at quicker speed. If her average speed of the whole journey is 24km/h, find the speed of return journey (in km/h)

(a) 25
(b) 30
(c) 35
(d) 38

$\xrightarrow{20\,km/h}$

$\xleftarrow[x\ km/h]{}$

20 & x

Avg Speed = 24 km/h
(H.m)

$\Rightarrow \dfrac{2}{\frac{1}{20}+\frac{1}{x}} = 24$

$\Rightarrow \dfrac{2}{\left(\frac{x+20}{20x}\right)} = 24$

$\dfrac{40x}{x+20} = 24$

$40x = 24x + 480$

$16x = 480$

$\boxed{x = 30}$

QUESTION

CA

If the Arithmetic mean between two numbers is 64 and the Geometric mean between them is 16. The Harmonic Mean between them is __________.

(a) 64
(b) 4
(c) 16
(d) 40

$AM = 64$ & $GM = 16$

$AM \times HM = GM^2$

$64 \times HM = (16)^2$

$\boxed{HM = 4}$

QUESTION

If all observations in a distribution are increased by 6, then the variance of the series will be __________.

(a) ~~Increased~~

(b) ~~Decreased~~

(c) $\boxed{\text{Unchanged}}$

(d) None of these.

QUESTION

The average of 5 quantities is 6 and the average of 3 is 8. what is the average of the remaining two.

(a) 4
(b) 5
(c) 3
(d) 3.5

$N_1 = 3$ | $N_2 = 2$

$\bar{x}_1 = 8$ | $\bar{x}_2 = ?$

$\bar{X}_{12} = 6$

$$\bar{X}_{12} = \frac{N_1\bar{x}_1 + N_2\bar{x}_2}{N_1 + N_2}$$

$$6 = \frac{3(8) + 2\bar{x}_2}{5}$$

$$30 = 24 + 2\bar{x}_2$$

$$6 = 2\bar{x}_2$$

$$\bar{x}_2 = 3$$

QUESTION

If standard deviation of first 'n' natural numbers is 2 then value of 'n' is

(a) 10 (b) 7

(c) 6 (d) 5

S.D of first 'n' natural no = 2

$$\sqrt{\frac{n^2-1}{12}} = 2$$

$$\Rightarrow \frac{n^2-1}{12} = 4$$

$$n^2-1 = 48$$

$$n^2 = 49$$

$$\boxed{n=7}$$

QUESTION

Geometric Mean of three observations 40, 50 and X is 10. The value of X is

(a) 2

(b) 4

(c) 1/2

(d) None of the above.

$$GM = [40 \times 50 \times x]^{1/3} = 10$$

$$(2000x)^{1/3} = 10^1$$

$$2000x = (10)^3$$

$$2\cancel{000}x = 1\cancel{000}$$

$$2x = 1$$

$$x = \frac{1}{2}$$

$$x^{\frac{1}{n}} = y$$

$$x = y^n$$

QUESTION

In a normal distribution, the relationship between the three most commonly used measures of dispersion are:

(a) Standard Deviation > Mean Deviation > Quartile Deviation

(b) Mean Deviation > Standard Deviation > Quartile Deviation

(c) Standard Deviation > Quartile Deviation > Mean Deviation

(d) Quartile Deviation > Mean Deviation > Standard Deviation

QD : MD : SD = 10 : 12 : 15

QUESTION

What will be the probable value of mean deviation? When $Q_3 = 40$ and $Q_1 = 15$

(a) 17.50 (b) 18.75

(c) 15.00 (d) None of the above

$Q_3 = 40$

$Q_1 = 15$

$QD = \frac{Q_3 - Q_1}{2}$

$QD = \frac{40-15}{2} \Rightarrow \boxed{QD = 12.5}$

$QD : MD = 10 : 12$

$\frac{QD}{MD} = \frac{10}{12} = \frac{5}{6}$

$\Rightarrow \frac{12.5}{MD} = \frac{5}{6}$

$\Rightarrow \boxed{MD = 15}$

QUESTION

The standard deviation of a variable x is known to be 10. The standard deviation of $\boxed{50 + 5x}$ is

(a) 50 (b) 100

(c) 10 (d) 500

$\sigma_x = 10$

S.D of $(\underbrace{50}_{\text{origin}} + \underbrace{5}_{\text{scale}}x)$

$= 5 \times 10$

$= 50$

Correlation & Regression

QUESTION

For some bivariate data, the following results were obtained for the two variables x and y :

$\bar{x} = 53.2$, $\bar{y} = 27.9$, $b_{yx} = -1.5$, $b_{xy} = -0.2$

The most probable value of y when x = 60 is :

(a) 15.6 (b) 13.4

(c) 19.7 (d) 17.7

Regr. equation y on x

$y - \bar{y} = b_{yx}(x - \bar{x})$

$y - 27.9 = -1.5(x - 53.2)$

$y - 27.9 = -1.5x + 79.8$

$y = -1.5x + 107.7$

at $x = 60$

$y = -1.5(60) + 107.7$

$= 17.7$

QUESTION

$\Sigma D^2 = 22$

$N = 10$

If the sum of squares of the rank difference in mathematics and physics marks of 10 students is 22, then the coefficient of rank correlation is:

(a) 0.267
(b) 0.867
(c) 0.92
(d) None

$$r = 1 - \frac{6 \Sigma D^2}{N^3 - N}$$

$$= 1 - \frac{6 \times 22}{10^3 - 10}$$

$$= 0.8666$$

QUESTION

Two random variables have the regression lines 3x + 2y = 26 and 6x + y = 31. The coefficient of correlation between x and y is :

(a) – 0.25 (b) 0.5

(c) – 0.5 (d) 0.25

y on x x on y

Let $3x + 2y = 26$ & $6x + y = 31$

$b_{yx} = -\frac{a}{b} = -\frac{3}{2}$ & $b_{xy} = -\frac{b}{a} = -\frac{1}{6}$

$b_{yx} \times b_{xy} = -\frac{3}{2} \times -\frac{1}{6} = \frac{3}{12} < 1$

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

$= -\sqrt{-\frac{3}{2} \times -\frac{1}{6}}$

$= -\sqrt{\frac{1}{4}}$

$= -\frac{1}{2} = -0.5$

QUESTION

For 10 pairs of observations, number of concurrent deviations was found to be 4. What is the value of the coefficient of concurrent deviation ?

(a) $\sqrt{0.2}$ (b) $1/3$

(c) $-1/3$ (d) $-\sqrt{0.2}$

$\boxed{n = 10}$

$\boxed{c = 4}$

$m = n - 1$
$= 10 - 1$
$= 9$

$$r = \pm\sqrt{\frac{2c - m}{m}}$$

$$= \sqrt{\frac{2(4) - 9}{9}}$$

$$= \sqrt{\frac{-1}{9}} = -\sqrt{\frac{1}{9}} = -\frac{1}{3} = -0.33$$

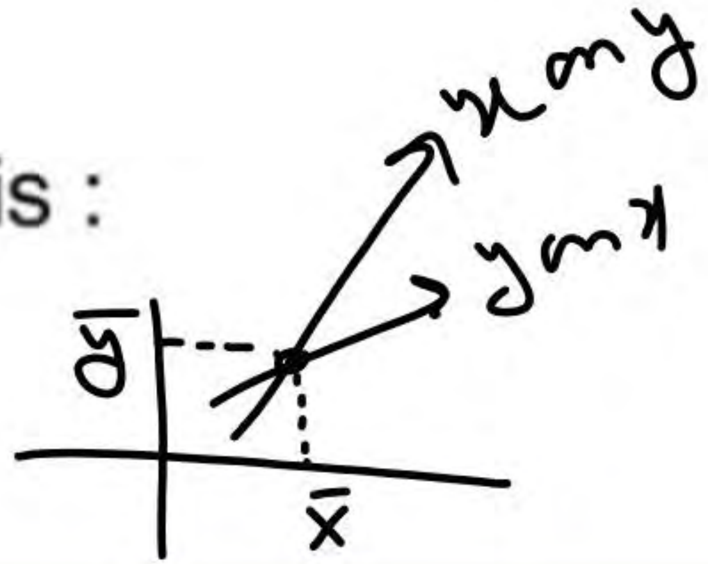
QUESTION

The lines of regression are as follows :

$5x - 145 = -10y$; $14y - 208 = -8x$. The mean values $(\bar{x}, \bar{y})$ is :

(a) (12, 5)　　　　(b) (5, 7)

(c) (7, 12)　　　　(d) (5, 12)



$5x - 145 = -10y$ & $14y - 208 = -8x$

$\boxed{5x + 10y = 145}$　　　　$\boxed{8x + 14y = 208}$

$5(5) + 10(12)$　　　　$8(5) + 14(12)$

$= 25 + 120 = 145$　　　　$40 + 168$

$= 208$

QUESTION

CA

The coefficient of rank correlation of marks obtained by 10 students, in English and Economics was found to be 0.5. It was later discovered that the difference in ranks in the two subjects obtained by one student was wrongly taken as 3 instead of 7. The correct coefficient of rank correlation is :

(a) 0.32
(b) 0.26
(c) 0.49
(d) 0.93

$\boxed{n=10}$

$\boxed{r=0.5}$

$r = 1 - \frac{6 \Sigma D^2}{N^3 - N}$

x	y	$D = R_1 - R_2$	D^2
		3 ×	9 ×
		7 ✓	49 ✓

$0.5 = 1 - \frac{6 \Sigma D^2}{10^3 - 10}$

$-0.5 = -\frac{6 \Sigma D^2}{990}$

wrong $\Sigma D^2 = 82.5$

Correct $\Sigma D^2 = 82.5 - 9 + 49$

$= 122.5$

Now correct r

$$= 1 - \frac{6\,\Sigma D^2}{n^3 - n}$$

$$= 1 - \frac{6 \times 122.5}{10^3 - 10}$$

$$= 0.2575$$

QUESTION

Given the following data :

$b_{xy} = 0.4$ & $b_{yx} = 1.6$. The coefficient of determination is :

(a) 0.74 (b) 0.42

(c) 0.58 (d) 0.64

$b_{xy} = 0.4$ & $b_{yx} = 1.6$

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

$= \sqrt{0.4 \times 1.6}$

$= 0.8$

Coeff of Determ

$= r^2$

$= (0.8)^2$

$= 0.64$

QUESTION

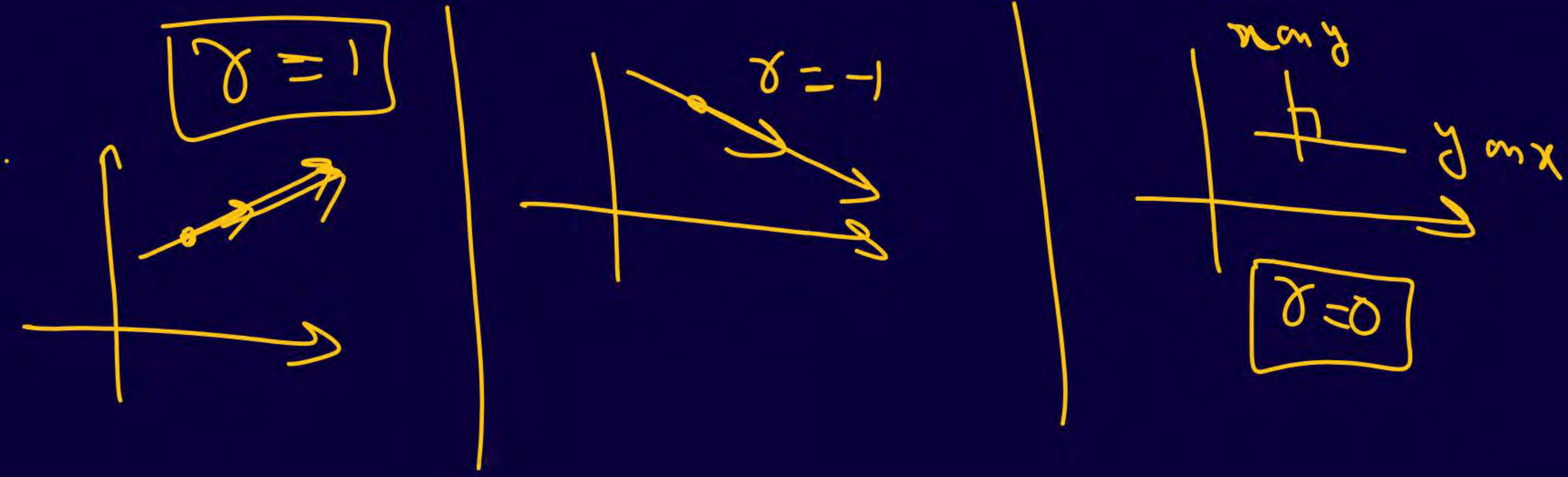
The method applied for deriving regression equations is known as :

(a) Concurrent deviation
(b) Product moment
(c) Least squares
(d) Normal equation

QUESTION

If the correlation coefficient between two variables is 1, then the two lines of regressions are :

(a) Parallel
(b) At right angles
(c) Coincident
(d) None of these



QUESTION

Regression coefficient are ________

(a) dependent of change of origin and of scale.

(b) independent of both change of origin and of scale.

(c) dependent of change of origin but not of scale.

(d) independent of change of origin but not of scale

$u_i = a x_i$ & $v_i = b y_i$

$$b_{vu} = \frac{\text{scale of } y}{\text{scale of } x} \times b_{yx}$$

$$b_{vu} = \frac{b}{a} \times b_{yx}$$

QUESTION

CA

If Y is dependent variable and X is Independent variable and the S.D of X and Y are 5 and 8 respectively and Co-efficient of co-relation between X and Y is 0.8. Find the Regression coefficient of Y on X.

(a) 0.78
(b) 1.28
(c) 6.8
(d) 0.32

$\sigma_x = 5$ & $\sigma_y = 8$

$r = 0.8$

$b_{yx} = r \dfrac{\sigma_y}{\sigma_x}$

$b_{yx} = \dfrac{0.8 \times 8}{5}$

$= 1.28$

QUESTION

CA

Take 200 and 150 respectively as the assumed mean for X and Y series of 11 values, then $dx = X - 200$, $dy = Y - 150$, $\Sigma dx = 13$, $\Sigma dx^2 = 2667$, $\Sigma dy = 42$, $\Sigma dy^2 = 6964$, $\Sigma dx\,dy = 3943$. The value of r is:

(a) 0.77
(b) 0.98
(c) 0.92 $\Rightarrow$ 0.9166
(d) 0.82

$u = x_i - A \qquad v = y_i - A$

$N = 11$

$\Sigma u = \Sigma dx = 13$

$\Sigma u^2 = \Sigma dx^2 = 2667$

$\Sigma v = \Sigma dy = 42$

$\Sigma v^2 = \Sigma dy^2 = 6964$

$\Sigma dx\,dy = 3943$

$\Sigma u.v = 3943$

$$r = \frac{\Sigma uv - \frac{\Sigma u \times \Sigma v}{N}}{\sqrt{\Sigma u^2 - \frac{(\Sigma u)^2}{N}}\sqrt{\Sigma v^2 - \frac{(\Sigma v)^2}{N}}}$$

$$= \frac{3943 - \frac{13 \times 42}{11}}{\sqrt{2667 - \frac{(13)^2}{11}}\sqrt{6964 - \frac{42^2}{11}}} = \frac{3893.36}{\sqrt{2651.63 \times 6803}}$$

QUESTION

CA

The coefficient of correlation between x and y series from the following data :

	X series	Y series
Number of pairs of observations	$N =$ 15	15
Arithmetic Mean	$\bar{x} =$ 25	18 $= \bar{y}$
Standard Deviation	$\sigma_x =$ 3.01	3.03 $= \sigma_y$
Sum of the squares of deviation from mean	$\Sigma(x_i-\bar{x})^2$ 136	138 $\Sigma(y_i-\bar{y})^2$

Sum of the product of the deviations of x and y series from their respective means = 122, is :

$\Sigma(x_i-\bar{x})\cdot(y_i-\bar{y})$

(a) 0.89 (b) 0.99
(c) 0.69 (d) 0.91

$$\gamma = \frac{\Sigma(x_i-\bar{x})\cdot(y_i-\bar{y})}{\sqrt{\Sigma(x_i-\bar{x})^2 \times \Sigma(y_i-\bar{y})^2}}$$

$$= \frac{122}{\sqrt{136 \times 138}}$$

$$= 0.8905$$

QUESTION

If one of regression coefficient is __________ unity, the other must be __________ unity.

(a) ~~more than, more then~~

(b) ~~Less than, Less then~~

(c) more than, less than

(d) Positive, Negative

$b_{yx} \times b_{xy} \le 1$

0.6 0.4

$0.6 \times 1.1 = 0.66$

QUESTION

CA

If $y = 18x + 5$ is the regression line of y on x value of b_{xy} is

(a) 5/18
(b) 18
(c) 5
(d) 1/18

y on x

$y = 18x + 5$

$\boxed{y = a + bx}$

$b_{yx} = 18$

$\boxed{b_{yx} \times b_{xy} \leq 1}$

$18 \times b_{xy}$

$\cancel{18} \times \frac{1}{\cancel{18}} = 1$

QUESTION

The coefficient of correlation between two variables x and y is 0.28. Their covariance is 7.6. If the variance of x is 9, then the standard deviation of y is:

(a) 8.048
(b) 9.048
(c) 10.048
(d) 11.048

$r(x,y) = 0.28$

$cov(x,y) = 7.6$

$\sigma_x^2 = 9$

$\sigma_x = 3$

$\sigma_y = ?$

$r = \frac{cov(x,y)}{\sigma_x \sigma_y}$

$0.28 = \frac{7.6}{3\sigma_y}$

$\sigma_y = 9.04$

QUESTION

Two variables x and y are related according to $\boxed{4x + 3y = 7}$. Then x and y are:

(a) ~~Positively correlated.~~

(b) Negatively correlated. → $\boxed{r = -1}$

(c) ~~Correlation is zero.~~

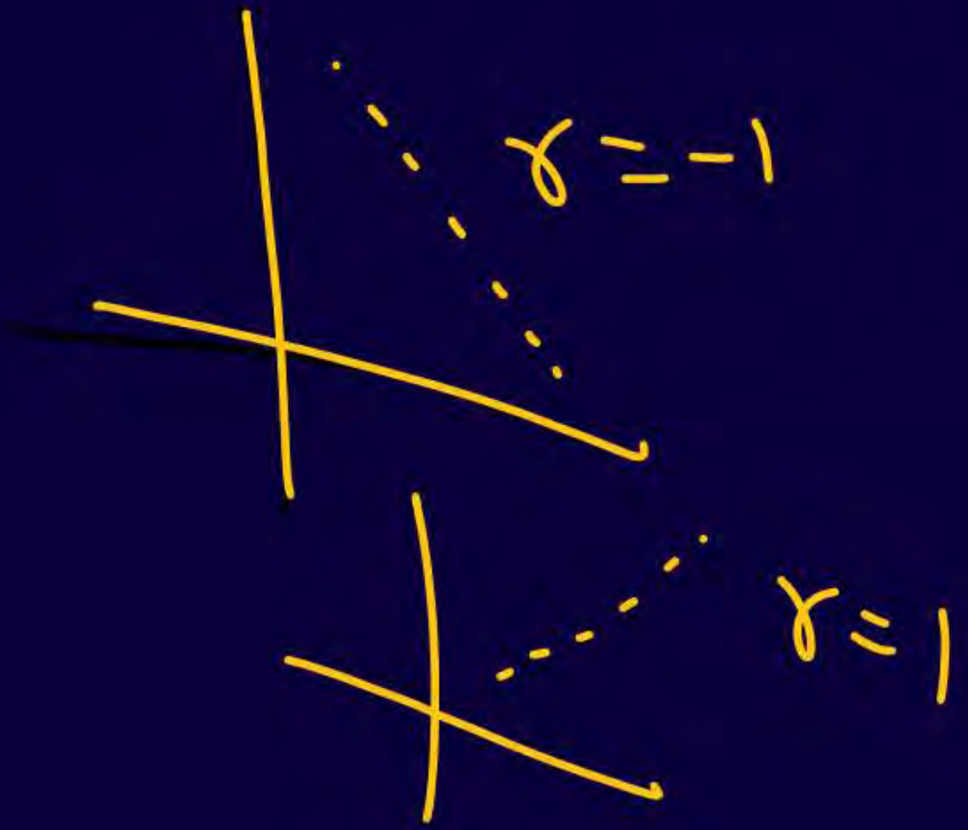
(d) None of these.

$$\boxed{4x + 3y = 7}$$

Linear Relation

$$3y = -4x + 7$$

$$\boxed{y = -\frac{4}{3}x + \frac{7}{3}}$$



Index Number

QUESTION

The number of test of Adequacy is :

(a) 2 (b) 3

(c) 4 (d) 5

→ unit

→ Time Reversal

→ factor Reversal

→ circular Test

QUESTION

Suppose a business executive was earning ₹ 2,050 in the base period, what should be his salary in the current period if his standard of living is to remain the same? Given $\Sigma W = 25$ and $\Sigma IW = 3544$:

(a) ₹ 2096

(b) ₹ 2906

(c) ₹ 2106

(d) ₹ 2306

Cost of Living

Laspeyre

Weight Price Relative

	Salary	Price index
B.Y.	2050	100
C.Y.	x	141.76

$$P_{01} = \frac{\Sigma(W_i I_1)}{\Sigma W_i} = \frac{3544}{25} = 141.76$$

$$\frac{2050}{x} = \frac{100}{141.76} \Rightarrow \boxed{x = 2906.08}$$

QUESTION

Circular Test is satisfied by :

(a) Paasche's Index Number.

(b) The simple geometric mean of price relatives and the weighted aggregative with fixed weights

(c) Laspeyre's Index Number

(d) None of these

Unit Test
⇓
Everyone
Except
Simple aggregative.

Time Reversal
⇓
→ Fisher
→ Simple Relative (GM)
→ Weighted Relative (GM)
→ Marshall.

Factor Reversal
⇓
Fisher

QUESTION

From the following data :

Group	:	A	B	C	D	E	F
Group Index	:	120	132	98	115	108	95
Weight	:	6	3	4	2	1	4

The general index is given by :

(a) 113.54 (b) 115.30

(c) 117.92 (d) 111.30

W	I	WI
6	120	
3	132	
4	98	
2	115	
1	108	
4	95	
20		2226

G.I.

$$= \frac{\Sigma W \cdot I}{\Sigma W}$$

$$= \frac{2226}{20}$$

$$= 111.3$$

QUESTION

The prices of a commodity in the year 1975 and 1980 were 25 and 30 respectively. Taking 1980 as the base year the price relative is :

(a) 113.25 (b) 83.33

(c) 109.78 (d) None

1975 ₹25

1980 ₹30

$$P.R = \frac{P_1}{P_0} \times 100$$

$$\frac{25}{30} \times 100$$

$$= 83.33$$

QUESTION

Net monthly salary of an employee was ₹ 3,000 in 1980. The consumer price index number in 1985 is 250 with 1980 as base year. If he has to be rightly compensated, then the Dearness Allowance to be paid to the employee is:

(a) ₹ 4,200 (b) ₹ 4,500

(c) ₹ 4,900 (d) ₹ 7,500

	Salary	Index
1980	3000	100
1985	x	250

$$\frac{3000}{x} = \frac{100}{250}$$

$$x = 7500$$

$$7500 - 3000 = 4500$$

QUESTION

Shifted Price index

$$= \frac{\text{Original Price Index}}{\text{Price index of the year on which } \textit{it has to be shifted}} \times 100:$$

(a) True (b) False

(c) Partly True (d) Partly False

	Year	Index	New Index
Old Base	2010	100	$\frac{100}{120} \times 100$
	2011	110	$\frac{110}{120} \times 100$
New Base	2012	120	100
	2013	150	$\frac{150}{120} \times 100$

QUESTION

Chain index is equal to :

(a) $\dfrac{\text{link relative of current year} \times \textit{chain index of the current year}}{100}$

(b) $\dfrac{\text{link relative of current year} \times \textit{chain index of the previous year}}{100}$

(c) $\dfrac{\text{link relative of previous year} \times \textit{chain index of the current year}}{100}$

(d) None of these

Link Relative	Chain index
100	100
120	$100 \times \frac{120}{100} = 120$
110	$120 \times \frac{110}{100} = 132$
140	$132 \times \frac{140}{100}$

QUESTION

The Circular Test is known as :

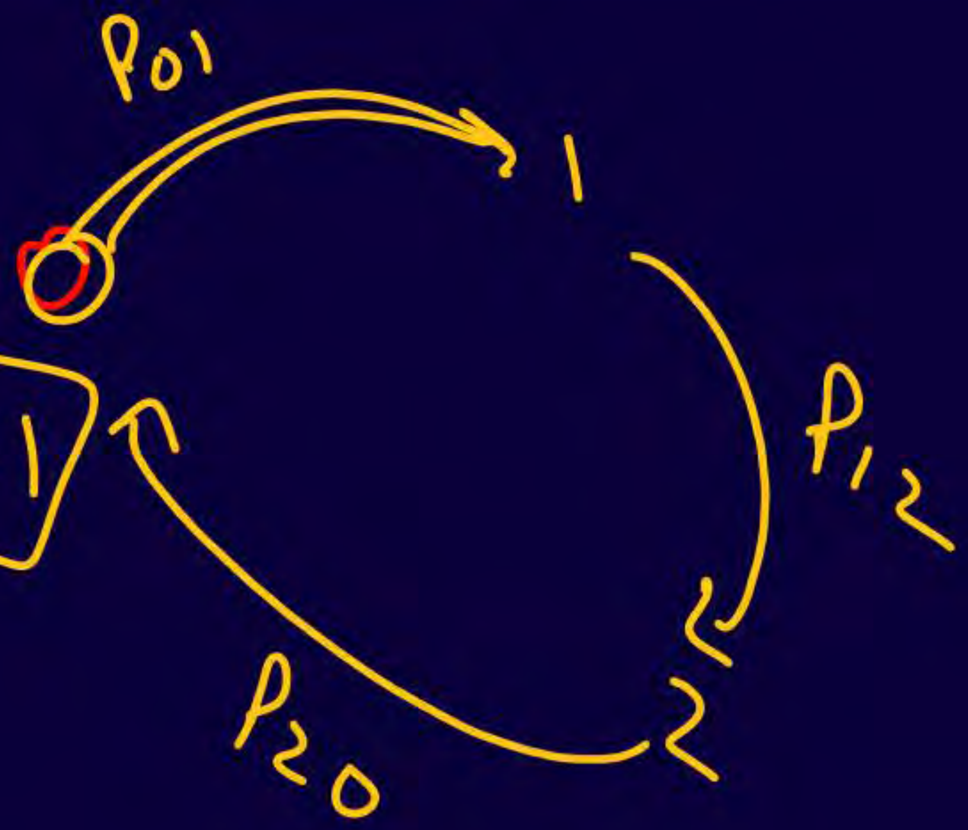
(a) $P_{01} \times P_{12} \times P_{20} = 1$

(b) $P_{12} \times P_{01} \, P_{20} = 1$

(c) $P_{20} \times P_{12} \, P_{01} = 1$

(d) $P_{02} \times P_{21} \, P_{12} = 1$

$\boxed{P_{01} \times P_{12} \times P_{20} = 1}$



QUESTION

Fisher's Index is based on :-

(a) Arithmetic Mean of Laspeyre and Paasche

(b) Geometric Mean of Laspeyre and Paasche

(c) Harmonic Mean of Laspeyre and Paasche

(d) Median of Laspeyre and Paasche.

$$f = \sqrt{L \times P}$$

QUESTION

Fisher's Ideal Index does not satisfy:

(a) Time Reversal Test

(b) Factor Reversal Test

(c) Unit Test

(d) Circular test

Unit ✓

T.R ✓

F.R ✓

C.T ✗

QUESTION

If Fisher's index = 150 and Paasche's Index = 144, then Laspeyre's index is __________.

(a) 147
(b) 156.25
(c) 104.17
(d) 138

$$\sqrt{L \times P} = F$$

$$\sqrt{L \times 144} = 150$$

$$L \times 144 = (150)^2$$

$$L = 156.25$$

QUESTION

What is the formula for calculating the deflated value?

(a) Current value/Price index of current year

(b) (Current value/Price index of current year)

(c) Price index of current year/Current value

(d) (Current value/Price index of last year) × 100

Index	Salary
100	12000
110	15000
140	16000

Real Salary $= \frac{\text{Salary}}{\text{Index}}$ → Deflated Salary

$\frac{12000}{100\%} = 12000$

$\frac{15000}{110\%} = 13636.36$

$\frac{16000}{140\%} = 11428.57$

QUESTION

Purchasing Power of Money is

(a) Reciprocal of price index number.

(b) Equal to price index number.

(c) Unequal to price index number.

(d) None of these.

Probability

QUESTION

The value of K for the probability density function of a variate X is equal to:

X	0	1	2	3	4	5	6
P(x)	5k +	3k +	4k +	6k +	7k +	9k +	11k = 1

(a) 39

(b) $\frac{1}{40}$

(c) $\frac{1}{49}$

(d) $\frac{1}{45}$

$45k = 1$

$k = 1/45$

QUESTION

The probability that a football team loosing a match at Kolkata is 3/5 and winning a match at Bengaluru is 6/7; the probability of the team winning at least one match is _____.

(a) 3/35
(b) 18/35
(c) 32/35
(d) 17/35

$P(\bar{K}) = \frac{3}{5}$ | $P(B) = \frac{6}{7}$

$P(K) = 1 - \frac{3}{5} = \frac{2}{5}$ | $P(\bar{B}) = 1 - \frac{6}{7} = \frac{1}{7}$

P(Atlest one match)

$= 1 - P(\text{No match win})$

$= 1 - P(\bar{K}\bar{B})$

$= 1 - \frac{3}{5} \times \frac{1}{7} = 1 - \frac{3}{35} = 32/35$

$P(K\bar{B}) + P(\bar{K}B) + P(KB)$

$= \frac{2}{5} \times \frac{1}{7} + \frac{3}{5} \times \frac{6}{7} + \frac{2}{5} \times \frac{6}{7}$

$= \frac{2 + 18 + 12}{35} = \frac{32}{35}$

QUESTION

If there are 48 marbles marked with numbers 1 to 48, then the probability of selecting a marble having the number divisible by 4 is:

(a) 1/2
(b) 2/3
(c) 1/3
(d) 1/4

$\underbrace{4, 8, 12, \ldots, 40, 44, 48}$

$\frac{48}{4} = 12$

$\frac{12}{48} = \frac{1}{4}$

QUESTION

CA

$2^3 = 8$

If an $\boxed{\text{unbiased coin}}$ is tossed three times, what is the probability of getting more than one head ?

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

(b) $\frac{3}{8}$

(c) $\frac{7}{8}$

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

HHH THH
HHT THT
HTH TTH
HTT TTT

$\frac{4}{8} = \frac{1}{2}$

QUESTION

If in a class, 60% of the student study Mathematics and science and 90% of the student study science, then the probability of a student studying mathematics given that he/she is already studying science is:

(a) 1/4
(b) 2/3
(c) 1
(d) 1/2

$P(M \cap S) = \frac{60}{100}$

$P(S) = \frac{90}{100}$

$P(M/S) = \frac{P(M \cap S)}{P(S)} = \frac{60/\cancel{100}}{90/\cancel{100}} = \frac{2}{3}$

QUESTION

If a speaks 75% of truth and B speaks 80% of truth. In what percentage both of them likely contradict with each other in narrating the same questions?

(a) 0.60
(b) 0.45
(c) 0.65
(d) 0.35

$P(A) = \frac{75}{100} = \frac{3}{4}$ | $P(B) = \frac{80}{100} = \frac{4}{5}$

$P(\bar{A}) = 1 - \frac{3}{4} = \frac{1}{4}$ | $P(\bar{B}) = 1 - \frac{4}{5} = \frac{1}{5}$

$P(A\bar{B}) + P(\bar{A}B)$

$= \left(\frac{3}{4}\right)\left(\frac{1}{5}\right) + \left(\frac{1}{4}\right)\left(\frac{4}{5}\right)$

$= \frac{3}{20} + \frac{4}{20} = \frac{7}{20} = 0.35$

QUESTION

$6^2 = 36$

When 2 fair dice are thrown what is the probability of getting the sum which is a multiple of 3?

(a) 4/36

(b) 13/36

(c) 2/36

(d) 12/36

Sum is multiple of 3

= Sum is 3 + Sum is 6 + Sum is 9 + Sum is 12

= (12)(21) + (15)(24)(33)(42)(51) + (36)(45)(54)(63) + (66)

$$\frac{12}{36} = \frac{1}{3}$$

QUESTION

If A, B, C are three mutually exclusive and exhaustive events such that:

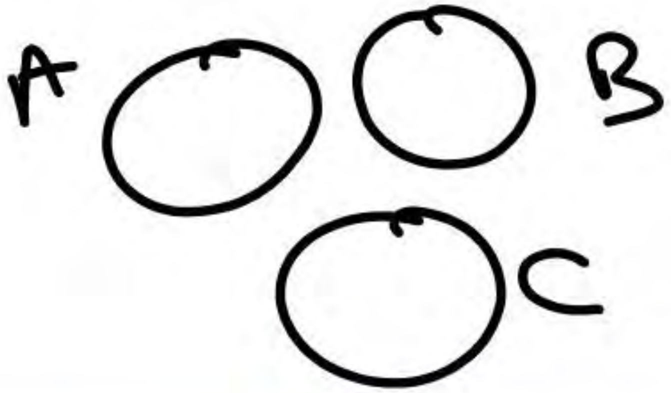
P(A) = 2(B) = 3P(C) what is P(B)?

(a) 6/11

(b) 3/11

(c) 1/6

(d) 1/3



$A \cup B \cup C = S$

Let $P(A) = 2P(B) = 3P(C) = K$

$\boxed{A = K}$

$2B = K$

$\boxed{B = \frac{K}{2}}$

$3C = K$

$\boxed{C = \frac{K}{3}}$

$P(A \cup B \cup C) = 1$

$P(A) + P(B) + P(C) = 1$

$\frac{K}{1} + \frac{K}{2} + \frac{K}{3} = 1$

$\frac{6K + 3K + 2K}{6} = 1$

$11K = 6$

$\boxed{K = \frac{6}{11}}$

$\boxed{B = \frac{K}{2} = \frac{3}{11}}$

QUESTION

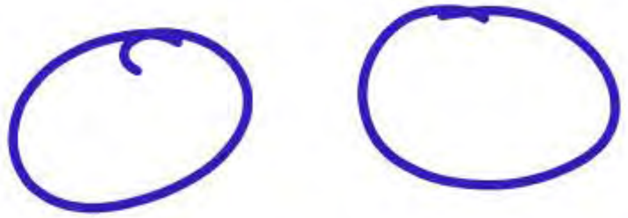
Two event A and B are such that they do not occurs simultaneously then they are called __________ events

(a) Mutually exhaustive

(b) Mutually exclusive

(c) Mutually independent

(d) Equally likely



$A \cap B = \phi$

QUESTION

Ram is known to hit a target in 2 out of 3 shots where as Shyam is known to hit the same target in 5 out of 11 shots. What is the probability that the target would be hit if they both try?

(a) $\frac{9}{11}$ (b) $\frac{3}{11}$

(c) $\frac{10}{33}$ (d) $\frac{6}{11}$

$P(R) = \frac{2}{3}$

$P(\bar{R}) = \frac{1}{3}$

$P(S) = \frac{5}{11}$

$P(\bar{S}) = \frac{6}{11}$

P(Hitting the target)

= 1 − P(Not hitting the target)

$= 1 - P(\bar{R}\bar{S})$

$= 1 - \frac{1}{3} \times \frac{6}{11}$

$= 1 - \frac{2}{11}$

$= \frac{9}{11}$

or $P(R\bar{S}) + P(\bar{R}S) + P(RS)$

QUESTION

$6^3 = 216$

Three identical and balanced dice are rolled. The probability that the same number will appear on each of them is.

(a) $\frac{1}{6}$

$\{(111)\ (222)\ (333)\ (444)\ (555)\ (666)\}$

(b) $\frac{1}{18}$

(c) $\frac{1}{36}$

$$\frac{6}{216} = \frac{1}{36}$$

(d) $\frac{1}{24}$

QUESTION

An event that can be subdivided into further events is called as.

(a) A composite event

(b) A complex event

(c) A mixed event

(d) A simple event

$S = \{1, 2, 3, 4, 5, 6\}$

A = even no $= \{2, 4, 6\}$

$\{2\}$ $\{6\}$ $\{4, 6\}$

$\{4\}$ $\{2, 4\}$

QUESTION

CA

If a coin is tossed $\boxed{5 \text{ times}}$ then the probability of getting Tail and Head occurs alternatively is

(a) $\frac{1}{8}$ (b) $\frac{1}{16}$

(c) $\frac{1}{32}$ (d) $\frac{1}{64}$

$$P(HTHTH) + P(THTHT)$$

$$= \left(\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\right) + \left(\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\right)$$

$$= \frac{1}{32} + \frac{1}{32} = \frac{2}{32} = \frac{1}{16}$$

QUESTION

If Y ≥ x then mathematical expectation is

(a) E (X) > E (Y)

(b) E (X) ≤ E (Y)

(c) E (X) = E (Y)

(d) E (X) . E (Y) = 1

$x \leq y$

$\Sigma p_i x_i \leq \Sigma p_i y_i$

$E(x) \leq E(y)$

x_i	p_i	$p_i x_i$
		$\Sigma p_i x_i$

$E(x) = \Sigma p_i x_i$
(μ)

QUESTION

The probability that a leap year has 53 Wednesday is

(a) $\frac{2}{7}$ (b) $\frac{3}{5}$

(c) $\frac{2}{3}$ (d) $\frac{1}{7}$

Non leap year

P(53 Sundy) = $\frac{1}{7}$

Leap year

P((53 Sundy) = $\frac{2}{7}$

QUESTION

Sum of all probabilities mutually exclusive and exhaustive events is equal to

(a) 0 (b) 1/2

(c) 1/4 (d) 1 (1 mark)

QUESTION

Variance of a random variable x is given by

(a) $E(X-\mu)^2$

(b) $E[X-E(X)]^2$

(c) $E(X^2-\mu)$

(d) (a) or (b)

Expectation (or mean)
$= E(x) = \Sigma p_i x_i = \mu$

Variance
$= E(x-\mu)^2$
$= \Sigma p_i (x-\mu)^2$
$= \Sigma p_i x_i^2 - (\Sigma p_i x_i)^2$

$E(x-E(x))^2$
$E(x-\mu)^2$

$\sigma^2 = \dfrac{\Sigma f_i (x_i-\bar{x})^2}{\Sigma f_i}$

QUESTION

The theorem of compound probability states that for any two events A an B

(a) $P(A \cap B) = P(A) \times P(B/A)$

(b) $P(A \cup B) = P(A) \times P(B/A)$

(c) $P(A \cap B) = P(A) \times P(B)$

(d) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$P(A \cap B) = P(AB) = P(A) \times P(B/A)$$

$$P(XY) = P(X) \times P(Y/X)$$

QUESTION

Two broad divisions of probability are:

(a) Subjective probability and objective probability

(b) Deductive probability and mathematical probability

(c) Statistical probability and mathematical probability

(d) None of these

QUESTION

The probability distribution of the demand for a commodity is given below:

Demand (x) $= x_i$	5	6	7	8	9	10
Probability [P(x)] $= p_i$	0.05	0.10	0.30	0.40	0.10	0.05

The expected value of demand will be

(a) 7.55 (b) 7.85

(c) 1.25 (d) 8.35

$\Sigma p_i x_i$

$= 0.25 + 0.60 + 2.10 + 3.20 + 0.90 + 0.50$

$= 7.55$

Expected value

$= E(x)$

$= \Sigma p_i x_i$

QUESTION

In a game, cards are thoroughly shuffled and distributed equally among four players. What is the probability that a specific player gets all the four kings?

(a) $\dfrac{{}^{13}C_4 \times {}^{48}C_{13}}{{}^{52}C_{13}}$

(b) $\dfrac{{}^{4}C_4 \times {}^{48}C_{9}}{{}^{52}C_{13}}$

(c) $\dfrac{{}^{13}C_4 \times {}^{52}C_{4}}{{}^{52}C_{13}}$

(d) $\dfrac{{}^{4}C_4 \times {}^{39}C_{9}}{{}^{52}C_{13}}$

$\dfrac{52}{4} = 13$

52

$K = 4 \rightarrow 4$

Non king $= 48 \rightarrow 9$

$\dfrac{{}^{4}C_4 \times {}^{48}C_9}{{}^{52}C_{13}}$

QUESTION

The odds against A solving a certain problem are 4 to 3 and the odds in favour of B solving the same problem are 7 to 5.
What is the probability that the problem will be solved if they both try ?

(a) 15/21 (b) 16/21
(c) 17/21 (d) 13/21

Sol: odds against A are 4 to 3 ($\bar{A}$ to A)

$P(A) = \frac{3}{7}$

$P(\bar{A}) = \frac{4}{7}$

odds in favor of B are 7 to 5 (B to $\bar{B}$)

$P(B) = \frac{7}{12}$

$P(\bar{B}) = \frac{5}{12}$

P(Prob is solved)
$= 1 - P(\text{Prob not solved})$
$= 1 - \bar{A}\,\bar{B} = 1 - \frac{4}{7} \times \frac{5}{12} = 1 - \frac{20}{84} =$

$1 - \frac{5}{21}$
$= \frac{16}{21}$

odds in favour of A

$= A : \bar{A}$

odds against of A

$= \bar{A} : A$

Theoretical Distribution

QUESTION

For a normal distribution with mean 150 and S.D. 45; find Q_1 and Q_3 :

(a) 119.35 and 190.65 respectively

(b) 119.65 and 180.35 respectively

(c) 180.35 and 119.65 respectively

(d) 123.45 and 183.65 respectively

$\mu = 150$

$\sigma = 45$

$Q_1 = \mu - 0.675\sigma$ & $Q_3 = \mu + 0.675\sigma$

$= 150 - 0.675(45)$

$= 150 - 30.375$

$= 119.625$

$= 150 + 0.675(45)$

$= 180.375$

QUESTION

The Interval (μ – 3δ, μ + 3δ) covers:

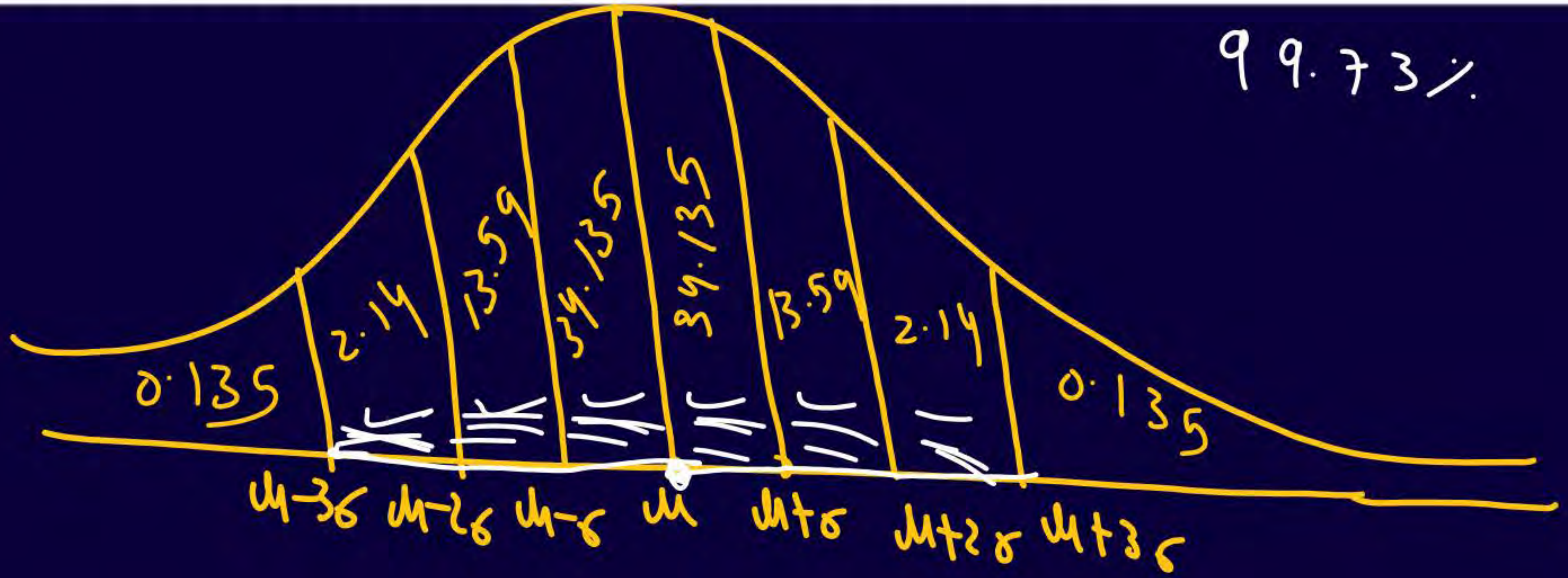
(a) 95% area of normal distribution

(b) 96% area of normal distribution

(c) 99% area of normal distribution

(d) All but 0.27% area of a normal distribution

99.73%



QUESTION

The overall percentage of failure in a certain examination is 0.30. What is the probability that out of a group of 6 candidates at least 4 passed the examination ?

(a) 0.74 (b) 0.71

(c) 0.59 (d) 0.67

$p = 0.70$

$q = 0.30$

$n = 6$

$P(X \geq 4)$

$= P(X=4) + P(X=5) + P(X=6)$

$= {}^6C_4 (0.70)^4 (0.30)^2 + {}^6C_5 (0.70)^5 (0.30)^1 + {}^6C_6 (0.70)^6 (0.30)^0$

$= 0.324135 + 0.302526 + 0.117649$

$= 0.74431$

QUESTION

CA

If 5% of the families in Kolkata do not use gas as a fuel, what will be the probability of selecting 10 families in a random sample of 100 families who do not use gas as fuel?

[Given : $e^{-5} = 0.0067$]

(a) 0.038
(b) 0.028
(c) 0.048
(d) 0.018

$m = np$

$= 100 \times \frac{5}{100}$

$\boxed{m = 5}$

$P(X=r) = \frac{e^{-m} m^r}{r!}$

$P(X=10) = \frac{e^{-5} (5)^{10}}{10!} = \frac{0.0067 \times 5^{10}}{3628800}$

$= 0.018036$

QUESTION

If the 1st quartile and Mean Deviation about median of a normal distribution are 13.25 and 8 respectively, then the mode of the distribution is:

(a) 20
(b) 10
(c) 15
(d) 23

$Q_1 = 13.25$

$MD_m = 8$

mode = ?

mean = median = mode = ?

$Q_1 = \mu - 0.675\sigma = 13.25$ & $MD = 0.8\sigma$

$8 = 0.8\sigma$

$\boxed{\sigma = 10}$

$\mu - 0.675(10) = 13.25$

$\boxed{\mu = 20}$

mean = med = mode = 20

QUESTION

If X is a Poisson variate with P (X = 0) = P (X = 1), then P (X = 2) = :

(a) $\frac{1}{6e}$ (b) $\frac{e}{6}$

(c) $\frac{1}{2e}$ (d) $\frac{e}{3}$

$P(X=0) = P(X=1)$

$\frac{\cancel{e^{-m}}\, m^0}{0!} = \frac{\cancel{e^{-m}}\, m^1}{1!}$

$\frac{1}{1} = m$

$\boxed{m = 1}$

$P(X=2)$

$= \frac{e^{-m}\, m^2}{2!}$

$= \frac{e^{-1}\,(1)^2}{2} = \frac{1}{2e}$

QUESTION

A sample of 100 dry battery cells tested to find the length of life produced the following results : $\bar{x} = 12$ hours, $\sigma = 3$ hours. What percentage of battery cells are expected to have life less than 6 hours?

[Area under the normal curve from $z = 0$ to $z = 2$ is 0.4772]

(a) 2.28% (b) 2.56%

(c) 4.56% (d) 1.93%

$\bar{x} = 12$

$\sigma = 3$

$P(X < 6)$

$= P\left(\frac{x-\mu}{\sigma} < \frac{6-12}{3}\right)$

$= P(z < -2)$

$= P(2 < z < \infty)$

$= 0.5 - 0.4772 = 0.0228$

QUESTION

Examine the validity of the following:
Mean and standard Deviation of a binomial distribution are 10 and 4 respectively.

(a) Not valid (b) Valid
(c) Both (a) & (b) (d) Neither (a) nor (b)

mean = 10

S.D = 4

$\sqrt{npq} = 4$

$npq = 16$

$\boxed{np = 10}$

$\underbrace{np}q = 16$

$10q = 16$

$q = 1.6$

×

QUESTION

An experiment succeeds twice as often as it fails. What is the probability that in next five trials there will be at least three successes?

(a) $\frac{33}{81}$ (b) $\frac{46}{81}$

(c) $\frac{64}{81}$ (d) $\frac{25}{81}$

$p = 2q$

$1 - q = 2q$

$1 = 3q$

$\boxed{q = \frac{1}{3}}$

$\boxed{p = \frac{2}{3}}$

$\boxed{n = 5}$

$P(X \geq 3)$

$= P(X=3) + P(X=4) + P(X=5)$

$= {}^5C_3 \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^2 + {}^5C_4 \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^1 + {}^5C_5 \left(\frac{2}{3}\right)^5 \left(\frac{1}{3}\right)^0$

$= 10\left(\frac{8}{27}\right)\left(\frac{1}{9}\right) + 5\left(\frac{16}{81}\right) \cdot \left(\frac{1}{3}\right) + (1)\left(\frac{32}{243}\right)(1)$

$= 0.7901$

QUESTION

In Poisson Distribution, probability of success is very close to :

(a) – 1
(b) 0
(c) 1
(d) None

Poisson

⇓

$n \longrightarrow \infty$

$p \longrightarrow 0$

$q \longrightarrow 1$

QUESTION

CA

For binomial distribution E(x) = 2, V (x) = 4/3. Find the value of n.

(a) 3

(b) 4

(c) 5

(d) 6

$\Downarrow$ mean

$np = 2$ & $\underbrace{np}_{\Downarrow}q = \frac{4}{3}$

$n \times \frac{1}{3} = 2$

$\boxed{n = 6}$

$2q = \frac{4}{3}$

$q = \frac{2}{3}$

$p = 1 - q$

$= 1 - \frac{2}{3}$

$p = \frac{1}{3}$

QUESTION

The Variance of standard normal distribution is

(a) 1 (b) μ

(c) σ^2 (d) 0

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

standard normal

$\boxed{\sigma = 1}$ $\boxed{\mu = 0}$

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(x)^2}$$

QUESTION

For a Poisson distribution P (x = 3) = 5 P(x = 5), then S.D. is

(a) 4 (b) 2

(c) 16 (d) $\sqrt{2}$

$$P(x=3) = 5\,P(x=5)$$

$$\frac{\cancel{e^{-m}}\,\cancel{m^3}}{3!} = 5\,\frac{\cancel{e^{-m}}\,m^{\cancel{5}}}{5!}$$

$$\Rightarrow \frac{1}{6} = 5 \times \frac{m^2}{120}$$

$$\Rightarrow \frac{120}{6 \times 5} = m^2$$

$m^2 = 4$

$m = 2$

mean = 2

varn = 2

SD = $\sqrt{2}$

QUESTION

For a Binomial distribution B (6, p), P(x = 2) = 9p(x = 4), then P is

(a) 1/2 (b) 1/3

(c) 10/13 (d) 1/4

$X \sim B(n, p)$

$B(6, p)$

$\boxed{n = 6}$

$P(X=2) = 9\, P(X=4)$

$\cancel{{}^6C_2}\, \cancel{p^2}\, q^{\cancel{4}\,2} = 9 \times \cancel{{}^6C_4}\, p^{\cancel{4}\,2}\, \cancel{q^2}$

$q^2 = 9p^2$

$(1-p)^2 = 9p^2$

$1 + p^2 - 2p = 9p^2$

$0 = 8p^2 + 2p - 1$

$0 = 8p^2 + 4p - 2p - 1$

$= 4p(2p+1) - 1(2p+1)$

$= (2p+1)(4p-1)$

$2p + 1 = 0$, $p = -\frac{1}{2}$ ✗

$4p - 1 = 0$, $p = \frac{1}{4}$

QUESTION

If standard deviation of a poisson distribution is 2, then its

(a) Mode is 2
(b) Mode is 4
(c) Modes are 3 and 4
(d) Modes are 4 and 5

$\sqrt{m} = 2$

$\boxed{m = 4}$

integer

4 & 4-1

ie 4 & 3 are two mode

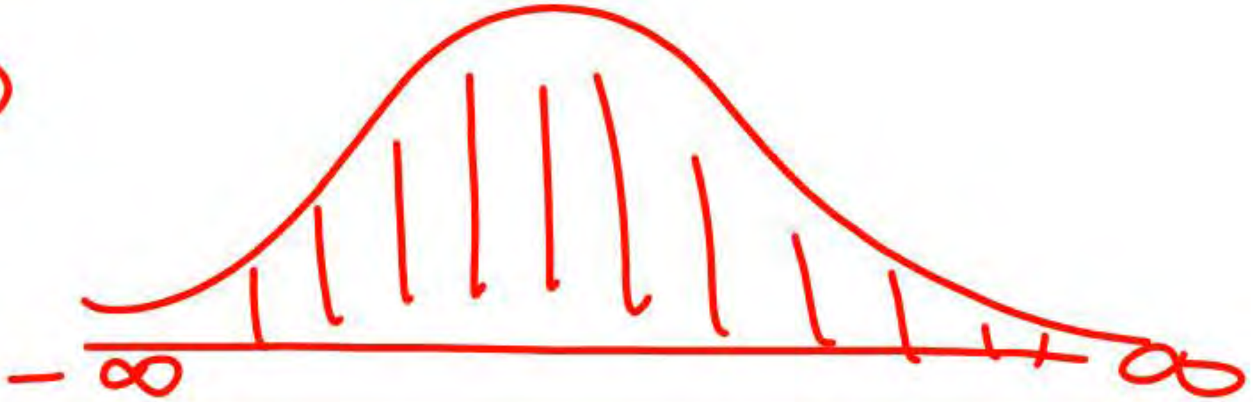
$$\text{mode} = \begin{cases} [m] & \text{if } m \text{ is non integer} \\ m \text{ \& } m-1 & \text{if } m \text{ is integer} \end{cases}$$

QUESTION

The area under the Normal curve is

(a) 1

(b) 0



(c) 0.5

(d) – 1

QUESTION

CA

If the inflexion points of a Normal Distribution are 6 and 14. Find its Standard Deviation ?

(a) 4 (b) 6

(c) 10 (d) 12.

$\mu - \sigma$ & $\mu + \sigma$ are point of inflexion

$\boxed{\mu - \sigma = 6}$

$\boxed{\mu + \sigma = 14}$

$2\mu = 20$

$\mu = 10$

$10 - \sigma = 6$

$\boxed{\sigma = 4}$

QUESTION

If $x \sim N(3,36)$ and $y \sim N(5,64)$ are two independent Normal variate with their standard parameters of distribution, then if $(x + y) \sim N(8,A)$ also follows normal distribution. The value of A will be ________.

(a) 100 (b) 10

(c) 64 (d) 36

$x \sim N(3, 36)$

$y \sim N(5, 64)$

$x+y \sim N(8, A)$

$A = 36+64$

$= 100$

Normal

$x \sim N(\mu_1, \sigma_1^2)$

$y \sim N(\mu_2, \sigma_2^2)$

$x+y \sim N(\mu_1+\mu_2, \sigma_1^2+\sigma_2^2)$

Poisson

$x \sim P(m_1)$

$y \sim P(m_2)$

$x+y \sim P(m_1+m_2)$

Binomial

$x \sim B(n_1, p)$

$y \sim B(n_2, p)$

$x+y \sim B(n_1+n_2, p)$

QUESTION

For binomial distribution

(a) Variance < Mean (b) Variance = Mean

(c) Variance > Mean (d) None of the above.

mean = np

Variance = npq

n = 10

p = 0.5

q = 0.5

mean = 10 × 0.5 = 5

Varian = 10 × 0.5 × 0.5 = 2.5

QUESTION

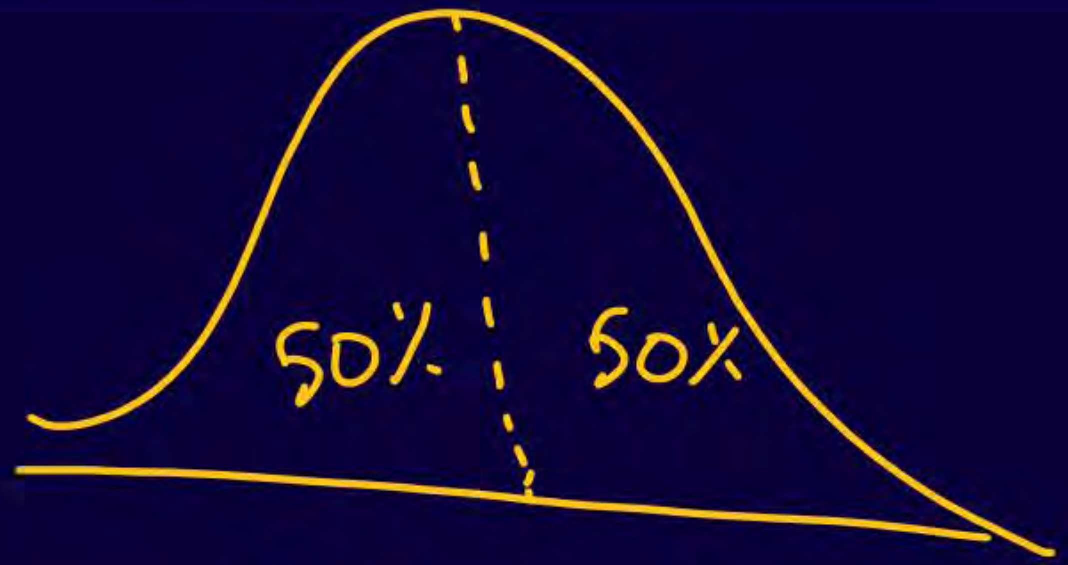
The normal curve is:

(a) Positively skewed

(b) Negatively skewed

(c) Symmetrical

(d) All these



Skewness = zero

Thank you