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MLT - 6 Semester



Q NO 1

part A

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$$\Rightarrow \text{Let's } \therefore u = x - n/2 \Rightarrow u = x - 7$$

$$\therefore v = y - n/2 \Rightarrow v = y - 19$$

x	y	u	v	u <sup>2</sup>	v <sup>2</sup>	uv
3	25	-4	6	16	36	-24
4	24	-3	5	9	25	-15
5	20	-2	1	4	1	-2
6	20	-1	1	1	1	-1
7	19	0	0	0	0	0
8	17	1	-2	1	4	-2
9	16	2	-3	4	9	-6
10	13	3	-6	9	36	-18
11	10	4	-9	16	81	-36
13	8	6	-11	36	121	-66
76	172	6	-18	96	314	-170

∴ Formula :- For finding  $\gamma$

Now :-

$$\gamma = \frac{\sum uv - (\sum u)(\sum v)/n}{\sqrt{\left[\sum u^2 - \frac{(\sum u)^2}{n}\right] \left[\sum v^2 - \frac{(\sum v)^2}{n}\right]}}$$

$$\sqrt{\left[\sum u^2 - \frac{(\sum u)^2}{n}\right] \left[\sum v^2 - \frac{(\sum v)^2}{n}\right]}$$



putting the value of table in formula.

$$\gamma = \frac{-170 - \frac{6 \times -18}{10}}{10}$$

$$\sqrt{\left[96 - \frac{96}{10}\right] \left[314 - \frac{314}{10}\right]}$$

$$\gamma = \frac{-1700 + 108}{10}$$

$$\sqrt{\left[\frac{960 - 96}{10}\right] \left[\frac{3140 - 314}{10}\right]}$$

$$\gamma = \frac{-1592}{10}$$

$$\sqrt{\left[\frac{864}{10}\right] \left[\frac{2826}{10}\right]}$$

$$\gamma = \frac{-1592}{10}$$

$$\sqrt{\frac{2441664}{100}}$$

$$\gamma = \frac{-1592}{1562.58} = \frac{-1592 \times 10}{1562.58 \times 10}$$



page 3

$$\gamma = \frac{-15,920}{15625.8} = 1.01 \text{ Ans}$$



X	Y	XY	X <sup>2</sup>	Y <sup>2</sup>
20	5	100	400	25
11	15	165	121	225
15	14	210	225	196
10	17	170	100	289
17	8	136	289	64
18	9	162	324	81
21	12	252	441	144
25	16	400	625	256
28	18	504	784	324
165	114	2269	3309	1604

The Regression equation of Y on X is

$$Y = a + bx$$

$$\Rightarrow b = \frac{n \sum XY - \sum X \sum Y}{n \sum X^2 - (\sum X)^2}$$

$$= \frac{9(2269) - (165)(114)}{9(3309) - (165)^2}$$

$$\Rightarrow b = \frac{20421 - 18810}{29781 - 27225} = \frac{1611}{2556}$$



$$\Rightarrow \boxed{b = 0.63} \rightarrow A$$

$$a = \frac{\sum y}{n} - b \left( \frac{\sum x}{n} \right)$$

$$a = \frac{114}{9} - 0.63 \left( \frac{165}{9} \right)$$

$$a = 12.66 - 0.63 (18.33)$$

$$a = 12.66 - 11.55$$

$$a = 1.11$$

∴ Thus Regression  $\sum v$  x on y

$$x = a + b \cdot y$$

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

$$b = \frac{9(2269) - (165)(114)}{9(1604) - (114)^2}$$

$$b = \frac{20421 - 18810}{14436 - 12396}$$

$$b = \frac{1611}{1440} \quad \boxed{b = 1.12} \rightarrow B$$



Thus Calculate Regression

n of x on y

$$\hat{x} = a + by$$

$$\hat{x} = 4.15 + 1.12y$$

$$\boxed{x = 5.27} \quad \text{part 9}$$



part B

$$\bar{x} = \frac{\sum x}{n} = \frac{165}{9} = 18.33$$

$$\bar{y} = \frac{\sum y}{n} = \frac{114}{9} = 12.66$$

$$b = 12.66 - 0.0316 \times 18.33$$

$$a = 12.66 - 0.579$$

$$a = 12.081$$

The estimation regression

$$\bar{y} = a + bx$$

$$y = 12.8 + 0.0316x$$

prediction of y when  $x = 20 + 11 + 15 + 35 + 28 + 18$

$$\text{of } x \quad 12.81 + 0.0316(100)$$

$$y = 12.081 + 3.128$$

$$y \approx 15.209$$



Q NO 2 B part (B)

pa

predicated values of  $y$  for  $x = 20, 11, 15, 25, 28$

$$\hat{y} = a + bx$$

$$= 1.11 + 0.63(20) \quad x = 20$$

$$\hat{y} = 1.11 + 12.6$$

$$\boxed{\hat{y} = 13.71} \rightarrow \textcircled{i}$$

$$\hat{y}^A = 1.11 + 0.63(11)$$
$$\boxed{\hat{y} = 10.56} \rightarrow \textcircled{ii}$$

$$\hat{y}^A = 1.11 + 6.63(15)$$

$$\boxed{\hat{y} = 10.56} \rightarrow \textcircled{iii}$$

$$\hat{y}^A = 1.11 + 6.63(25)$$

$$\boxed{\hat{y} = 16.86} \rightarrow \textcircled{iv}$$

$$\hat{y}^A = 1.11 + 6.63(28)$$

$$\boxed{\hat{y} = 18.75} \rightarrow \textcircled{v}$$

predicated value of  $x$  for  $y$

$$y = 5, 15, 9, 12, 16, 18$$



$$\bar{x} = 4 \cdot 15 + 1 \cdot 12 (5)$$

$$\boxed{\bar{x} = 9.75} \rightarrow \textcircled{i}$$

$$\bar{x} = 4 \cdot 15 + 1 \cdot 12 (15) \quad y = 15$$

$$\boxed{\bar{x} = 20.95} \rightarrow \textcircled{ii}$$

~~4.5~~

$$\bar{x} = 4 \cdot 15 + 1 \cdot 12 (9) \quad y = 15$$

$$\boxed{\bar{x} = 17.59} \rightarrow \textcircled{iii}$$

$$y = 9$$

$$\bar{x} = 4 \cdot 15 + 1 \cdot 12 (12)$$

$$\boxed{\bar{x} = 17.59} \rightarrow \textcircled{iv}$$

$$y = 12$$

$$\bar{x} = 4 \cdot 15 + 1 \cdot 12 (16)$$

$$y = 16$$

$$\boxed{\bar{x} = 22.09} \rightarrow \textcircled{v}$$

$$\bar{x} = 4 \cdot 15 + 1 \cdot 12 (18)$$

$$y = 18$$

$$\boxed{\bar{x} = 24.31}$$



$$\bar{x} = 4 \cdot 15 + 1 \cdot 19$$

QNO 2 part A

$$n = 5$$

Let  $x$  denote number of heads

$$x = 0, 1, 2, 3, 4, 5$$

$$P(x=x) = C_x^n p^x q^{n-x}$$

$$p = 2/3, q = 1-p$$

$$q = 1 - 2/3$$

$$q = 1/3 - 2/3$$

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

$$q = 1/3$$

$$P(x=0) = C_0^5 \times \left(\frac{2}{3}\right)^0 \left(\frac{1}{3}\right)^{5-0}$$

$$P(x=0) = 1/32 \quad \text{Ans.}$$

~~x~~ p



$$P(X=1) = {}^5C_1 \left(\frac{2}{3}\right)^1 \left(\frac{1}{3}\right)^{5-1}$$

$$= {}^5C_1 \left(\frac{2}{3}\right) \left(\frac{1}{3}\right)^4$$

$$P(X=1) = \frac{5}{3^2}$$

$$P(X=2) = {}^5C_2 \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^{5-2}$$

$$= \left(\frac{5!}{2!}\right) \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^3$$

$$P(X=2) = \frac{10}{3^2}$$

$$P(X=3) = \left(\frac{5}{3}\right) \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^{5-3}$$

$$= \left(\frac{5}{3}\right) \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^2$$

$$P(X=3) = \frac{10}{3}$$

$$P(X=4) = \left(\frac{5}{4}\right) \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^{5-4}$$

$$= \left(\frac{5}{4}\right) \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^1$$

$$P(X=4) = \frac{5}{3^2}$$



$$P(X=5) = \binom{5}{5} \left(\frac{2}{3}\right)^5 \left(\frac{1}{3}\right)^{5-5}$$
$$= \binom{5}{5} \left(\frac{2}{3}\right)^5 \left(\frac{1}{3}\right)^0$$

$$P(X=5) = \frac{1}{32}$$

Hence : probability of various trials

X	0	1	2	3	4	5
P(X)	$\frac{1}{32}$	$\frac{5}{32}$	$\frac{10}{32}$	$\frac{10}{32}$	$\frac{5}{32}$	$\frac{1}{32}$

Ans



Q NO 3 part A

(13)

Given Data

2	6	1	5	4	3	3	2	10	2
4	3	3	0	5	2	1	11	10	3
5	3	3	0	3	3	2	2	7	4
1	4	1	4	4	4	6	8	10	7
7	5	0	5	1	2	3	9	2	2

Uncomplete - Frequency distribution

NO	Tolly mark	Frequency	Cumeltil frequency
0		1	1
1		4	5
2		8	13
3		11	24
4		8	32
5		5	37
6		4	41
7		3	44
8		2	46
9		1	47
10		3	50



Q NO 3

part B

Given information of children Blw to 50 woman.

2	6	1	5	4	3	3	8	10	1
4	3	3	0	5	2	1	4	10	3
5	3	3	6	3	3	2	2	7	4
1	4	2	4	4	4	6	8	10	7
7	5	6	5	3	2	3	9	2	2

group frequency distribution for given data

$$N = 50 \text{ data}$$

$$N = 50 \quad x_0 = 1 \quad x_m = 10$$

$$\text{Range} = x_m - x_0$$

$$R = 10 - 1 = \boxed{9}$$

$$K = 1 + 3.3 \log N$$

$$= 1 + 3.3 \log(50)$$

$$= 1 + 3.3 (1.698)$$

$$= 1 + 5.6034$$

$$K = 6.606 = \boxed{6}$$



$$h = \frac{9}{7} = 1.285 = \boxed{2}$$

(15)

We find out information from data.

$$N = 50 \quad R = 9, \quad K = 6 \quad h = 2$$

Classes	Frequency	Class boundaries	Main point
0-1	5	0.5-1.5	1
2-3	19	1.5-3.5	2.5
4-5	13	3.5-5.5	4.5
6-7	7	5.5-7.5	6.5
8-9	3	7.5-9.5	8.5
10-11	3	10.5-11.5	11

Total 50

R-Fraction	R-Frequency	C-F	R-e-f
5/50	5/50 x 100 = 10	5	5/50 = 0
19/50	19/50 x 100 = 38	24	24/50 = 0
13/50	13/50 x 100 = 26	37	37/50 = 0
7/50	7/50 x 100 = 14	44	44/50 = 0
3/50	3/50 x 100 = 6	47	47/50 = 0
5/50	5/50 x 100	50	50/50 = 0