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Q: NO 1 (a)

To calculate correlation coefficient b/w X and Y

Price (X)	3	4	5	6	7	8	9	10	11	13
Demand Y	25	24	20	20	19	17	16	13	10	8

Let $u = X - 7$ and $v = Y - 19$ then

$r_{xy} = r_{uv}$, the calculation needed to find r

X	Y	u	v	u^2	v^2	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

Now

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

Putting values.

(3)

$$= \frac{-170 - \frac{(6 \times -18)}{10}}{\sqrt{\left[96 - \frac{(6)^2}{10}\right]\left[314 - \frac{(-18)^2}{10}\right]}}$$

$$= \frac{-170 + 10.8}{\sqrt{\left[96 - \frac{36}{10}\right]\left[314 - \frac{324}{10}\right]}}$$

$$= \frac{-159.2}{\sqrt{(96 - 3.6)(314 - 32.4)}}$$

$$= \frac{-159.2}{\sqrt{92.4 \times 281.6}}$$

$$= \frac{-159.2}{\sqrt{26019.84}}$$

$$= \frac{-159.2}{161.30}$$

$$= \boxed{-0.98} \quad \text{ANS}$$

QNO1: B

X	20	11	15	10	17	18	21	25	28
Y	5	15	14	17	8	9	12	16	18

Y on X

$\hat{Y} = a + bX$

and

$\Sigma Y = na + b\Sigma X$

$\Sigma XY = a\Sigma X + b\Sigma X^2$

X	Y	XY	X^2
20	5	100	400
11	15	165	121
15	14	210	225
10	17	170	100
17	8	136	289
18	9	162	324
21	12	252	441
25	16	400	625
28	18	504	784
165	114	2099	3309

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

$\bar{Y} = \frac{\Sigma Y}{n} = \frac{114}{9} = 12.66$

$b = \frac{n\Sigma XY - (\Sigma X)(\Sigma Y)}{n\Sigma X^2 - (\Sigma X)^2} = \frac{9(2099) - (165)(114)}{9(3309) - (165)^2}$

$$b = \frac{18891 - 18810}{29781 - 27225} = \frac{81}{2556} = 0.03$$

and

$$a = \bar{Y} - b\bar{X}$$

$$a = 12.66 - 0.03 \times 18.33$$

$$a = 12.66 - 0.54$$

$$a = 12.12$$

Hence $\hat{Y} = a + bX$

$$\boxed{\hat{Y} = 12.12 + 0.03X}$$

Now to find X on Y

$$\hat{X} = a + bY$$

$$\boxed{\hat{X} = 12.12 + 0.03Y}$$

To find Predicted values ~~for~~ of Y for X

$\hat{Y} = 12.12 + 0.03(20) = \boxed{12.72}$

$\hat{Y} = 12.12 + 0.03(11) = \boxed{12.45}$

$\hat{Y} = 12.12 + 0.03(15) = \boxed{12.57}$

$\hat{Y} = 12.12 + 0.03(25) = \boxed{12.87}$

$\hat{Y} = 12.12 + 0.03(28) = \boxed{12.96}$

To find Predicted values of X for Y

$\hat{X} = 12.12 + 0.03(5) = \boxed{12.27}$

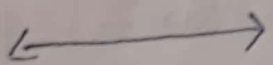
$= 12.12 + 0.03(15) = \boxed{12.57}$

$= 12.12 + 0.03(9) = \boxed{12.39}$

$= 12.12 + 0.03(12) = \boxed{12.48}$

$= 12.12 + 0.03(16) = \boxed{12.6}$

$= 12.12 + 0.03(18) = \boxed{12.66}$



Q2:- A

A Fair coin is tossed 5 Times Find the probability of obtained various number of head.

Then we observed that

(1) Each toss of coin has two possible outcome head and tail.

(2) The Probability of a head is $P = 1/2$ and remain the same for successive tosses.

(3) The successive toss of the coin are independent.

(4) The coin is tossed 5 times.

Therefore the r.v X which denoted the number of heads (successes) has a binomial Probability distribution with $p = 1/2$ and $n = 5$ the possible values of X are 1, 2, 3, 4 and 5.

$P(\text{no head}) = P(x=0) = \binom{5}{0}\left(\frac{1}{2}\right)^0\left(\frac{1}{2}\right)^5 = 1 \times \left[\frac{1}{2}\right]^5 = \boxed{\frac{1}{32}}$

$P(1\text{ head}) = P(x=1) = \binom{5}{1}\left(\frac{2}{1}\right)^1\left(\frac{1}{2}\right)^{5-1} = 5 \times \left(\frac{1}{2}\right)^5 = \boxed{\frac{5}{32}}$

$P(x=2) = \binom{5}{2}\left(\frac{1}{2}\right)^2\left(\frac{1}{2}\right)^{5-2} = 10 \times \left(\frac{1}{2}\right)^5 = \boxed{\frac{10}{32}}$

$P(x=3) = \binom{5}{3}\left(\frac{1}{2}\right)^3\left(\frac{1}{2}\right)^{5-3} = 10 \times \left[\frac{1}{2}\right]^5 = \boxed{\frac{10}{32}}$

$P(x=4) = \binom{5}{4}\left(\frac{1}{2}\right)^4\left(\frac{1}{2}\right)^{5-4} = 5 \times \left(\frac{1}{2}\right)^5 = \boxed{\frac{5}{32}}$

$P(x=5) \quad \binom{5}{5}\left(\frac{1}{2}\right)^5\left(\frac{1}{2}\right)^0 = 1 \times \left(\frac{1}{2}\right)^5 = \boxed{\frac{1}{32}}$.

Q.No2. B :

we observe that.

(a) There are two possible outcomes i.e A will win or will not win the game.

(b) The Probability of A's winning in each game is $p = \frac{2}{3}$

(c) The successive games are independently won or lost, and

(d) There are 10 games.

Therefore the ~~Bino~~ Binomial Probability distribution with ~~n=8~~ $n = 10$ and $p = \frac{2}{3}$ is appropriate.

Let X denote the number of games won by A. then

Solution here

Therefore the binomial probability distribution

then $n = 10$

$p = 2/3$

$q = 1 - p$

$q = 1 - 2/3$

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

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

Let x denote the number of won by A then.

(i) $P(x \geq 4) = 1 - P(x < 4)$

$= 1 - \sum_{x=0}^{3} \binom{10}{x} \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{10-x}$

$= 1 - \left[\left(\frac{1}{3}\right)^{10} + 10\left(\frac{2}{3}\right)^1\left(\frac{1}{3}\right)^9 + 45\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^8 + 120\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^7\right]$

$= 1 - \frac{1}{5949}\left[1 + 20 + 180 + 960\right]$

$= 1 - 0.0197 = \boxed{P(x \geq 4) = 0.9803}$

(ii)

$$P = (x=4) = \binom{10}{4}\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^6$$

$$= 20\left(\frac{16}{81}\right)\left(\frac{1}{729}\right)$$

$$= \frac{3360}{59049}$$

$$\boxed{= P(x=4) = 0.056}$$

(iii)

$P(x=11) = f(0)$ because x can take only values between 0 and 10, 0, 1, 2, ... 10

(iv)

6 or more games

$$P(x>6) = \sum_{x=6}^{10} \binom{10}{x}\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{10-x}$$

$$= \binom{10}{6}\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^4 + \binom{10}{7}\left(\frac{2}{3}\right)^7\left(\frac{1}{3}\right)^3 +$$

$$\binom{10}{8}\left(\frac{2}{3}\right)^8\left(\frac{1}{3}\right)^2 + \binom{10}{9}\left(\frac{2}{3}\right)^9\left(\frac{1}{3}\right)^1$$

$$+ \binom{10}{10}\left(\frac{2}{3}\right)^{10}\left(\frac{1}{3}\right)^{0}$$

~~0.22~~ $0.228 + 0.261 + 0.196 + 0.087 + 0.018$

$$\boxed{P(x \geq 6) = 0.79}$$

Q3 A

Construct the ungrouped frequency of distribution of these data.

Now

ungrouped data frequency distribution.

children	Telly	frequency.
0	I	1
1	IIII	4
2	𝍸 III	8
3	𝍸 𝍸 I	11
4	𝍸 III	8
5	𝍸	5
6	IIII	4
7	IIII	4
8	I	1
9	I	1
10	III	3
Totall		50

Q NO 2 PART B

N = 50

smallest values = 0

Largest values = 10

Range = 10 - 0 = 10

No of classes = $1+3.3 \log N$

$= 1 + 3.3 \log 10$

$= 4.3$

$= 4$

class interval $= \frac{\text{Range}}{\text{no of classes}}$

$= \frac{10}{4}$

$= 2.5$

$= 2$

class interval	f	Telly	C.B
0 – 2	13	𝍸 𝍸 |||	-0.5 – 2.5
3 – 5	24	𝍸 𝍸 𝍸 𝍸 ||||	2.5 – 5.5
6 – 8	9	𝍸 ||||	5.5 – 8.5
9 – 11	4	||||	8.5 – 11.5
	50		

The END