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Q1:- Calculate the correlation cofficent between 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

Ans:- From the Given data

x	y	$x-\bar{x}$	$y-\bar{y}$	$x-\bar{x}^2$	$y-\bar{y}^2$	$(x-\bar{x})(y-\bar{y})$
3	25	-4.6	7.8	21.16	60.84	-35.88
4	24	-3.6	0.8	12.96	162.96	-24.48
5	20	-2.6	2.8	6.76	7.84	-7.28
6	20	-1.6	2.8	2.56	7.84	-4.48
7	19	-0.6	1.8	0.36	3.24	-1.08
8	17	0.4	-0.2	0.16	0.0256	-0.08
9	16	1.4	-1.2	1.96	3.8416	-1.68

P To →

x	y	$x-\bar{x}$	$y-\bar{y}$	$x-\bar{x}^2$	$y-\bar{y}^2$	$(x-\bar{x})(y-\bar{y})$
10	13	2.4	-4.2	5.76	33.18	-10.08
11	18	3.4	-7.2	11.56	133.63	-24.48
13	8	4.4	-9.2	19.36	374.81	40.48
76				82.6	793.2072	-150

For the correlation between x and y

$$= \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\sqrt{\Sigma(x-\bar{x})^2 \Sigma(y-\bar{y})^2}}$$

Now :-

$$\bar{x} = \frac{76}{10} = 7.6$$

$$\bar{y} = \frac{172}{10} = 17.2$$

putting values

$$\gamma = \frac{-150}{\sqrt{82.6 \times 793.2072}}$$

$$r = \frac{-150}{\sqrt{65518.913}}$$

$$r = \frac{-150}{255.97}$$

$$r = -0.58 \quad \text{Answer}$$

Q1 part 13 :-

Answer :- From the Given data -

X	Y	XY	X^2	Y^2
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	2099	3309	1604

For the regression line of

y on $x = a + bx$

$$y = a + bx$$

$$\Rightarrow a = \bar{y} - b\bar{x}$$

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

Puting values -

$$a = \bar{y} - b\bar{x}$$

$$\Rightarrow a = \frac{114}{9} - 0.032 \times \frac{165}{9}$$

$$\Rightarrow a = 12.7 - 0.59$$

$$\Rightarrow a = 12.11$$

Now For

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

putting values -

$$\Rightarrow b = \frac{9 \times 2099 - 105 \times 144}{9 \times 3309 - (105)^2}$$

$$\Rightarrow b = \frac{18891 - 18810}{29781 - 27225}$$

$$\Rightarrow b = \frac{81}{2556}$$

$$\Rightarrow b = 0.032$$

So we have:-

$$\hat{y} = 12.11 + 0.032x$$ **Answer**

⇒ part I = B

For the regression line of x on $y = a + by$

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

$$\Rightarrow a = \bar{x} - b\bar{y}$$

puting values

pTo →

$$a = \frac{\Sigma y}{9} - 0.056 \times \frac{\Sigma x}{9}$$

$$a = 18.3 - 0.056 \times 12.7$$

$$a = 18.3 - 0.7112$$

$$a = 17.58$$

Now:-

$$\beta = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma y^2 - (\Sigma y)^2}$$

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

putting values

$$\Rightarrow b = \frac{9 \times 2099 - 105 \times 114}{9 \times 1604 - (114)^2}$$

$$\Rightarrow b = \frac{18891 - 18810}{14436 - 12996}$$

$$\Rightarrow b = \frac{81}{1440}$$

PTO —

$$b = \frac{81}{1440}$$

$$b = 0.056$$

Ge:-

$$\hat{x} = 17.58 + 0.056y$$ Answer

Q2 part B):-

Predicted value-

From the Given value —

For $x = 20 \Rightarrow y = 12.11 + 0.032 \times 20 = 12.75$

For $x = 11 \Rightarrow y = 12.11 + 0.032 \times 11 = 12.46$

For $x = 15 \Rightarrow y = 12.11 + 0.032 \times 15 = 12.59$

For $x = 25 \Rightarrow y = 12.11 + 0.032 \times 25 = 12.91$

For $x = 28 \Rightarrow y = 12.11 + 0.032 \times 28 = 13.006$

The abov are the predicted value of y For x

PT.O

Now For the predicted value of x for y is

For $y=5 \Rightarrow x = 17.58 + 0.056 \times 5 = 17.86$

For $y=15 \Rightarrow x = 17.58 + 0.056 \times 15 = 18.42$

For $y=9 \Rightarrow x = 17.58 + 0.056 \times 9 = 18.084$

For $y=12 \Rightarrow x = 17.58 + 0.056 \times 12 = 18.252$

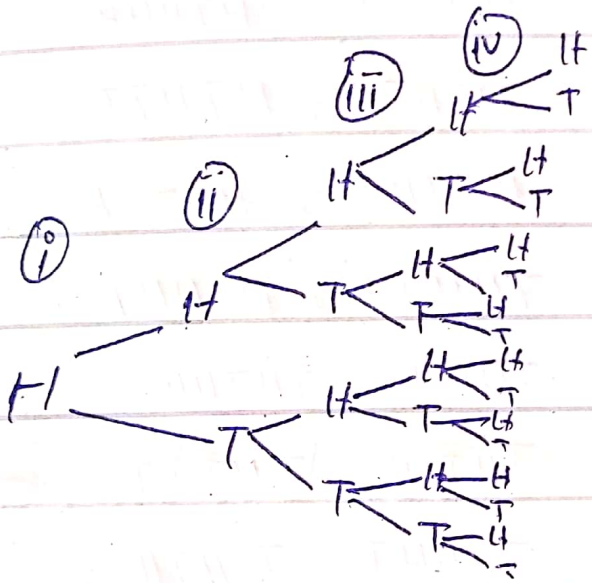
For $y=16 \Rightarrow x = 17.50 + 0.056 \times 16 = 18.476$

For $y=18 \Rightarrow x = 17.56 + 0.056 \times 18 = 18.568$

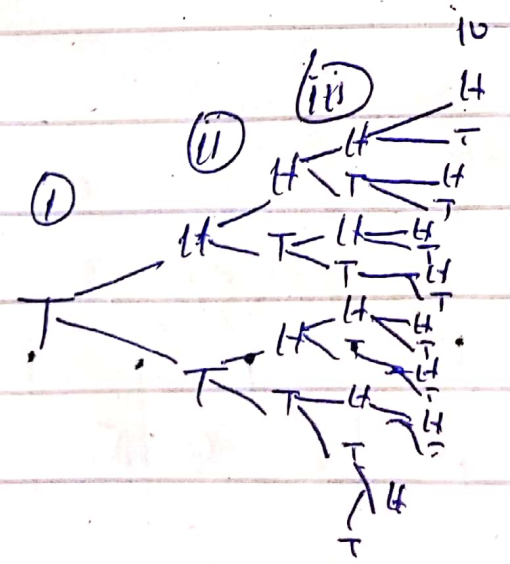
Q2 :- part = A :-

= Lets draw a Sample Tree For the Expirement

⇒ Sample tree :-



Now For Tail



The Sample Space

$S = \{$ HHHHH , HHHHT , HHHTH
HHHTT , HHTHH , HHTHT
HHTTH , HHTTT , HTHHH
HTHHT , HTHTH , HTTHT
HTTTH , HTTHT , HTTTH
HTTTT , THHHH , THHHT
THHTH , THHTT , THTHH
THTHT , THTTH , THTTT
TTHHH , TTHHT , TTHTH
TTHTT , TTTHH , TTTHT
TTTTH , TTTTT $\}$

number of Spin

$n_S = 32$

Lets draw

No of Heads	0	1	2	3	4	5
	1	5	10	10	5	1

$\Rightarrow P(x=0) = 1/32$ — Ans

$\Rightarrow P(x=1) = 5/32$ — Ans

$\Rightarrow P(x=2) = 10/32$ — Ans

$\Rightarrow P(x=3) = 10/32$ — Ans

$\Rightarrow P(x=4) = 5/32$ — Ans

$= P(x=5 = 1/35$ — Ans

Q2:- part 13:-

From the Given data =

$$p = 2/3 \quad , q\ 1/3 \quad , n = 10$$

P(At least 4 games) $= 1 - (P$(at most 3 games)

$$= 1 - \left\{ \binom{10}{0}\left(\frac{2}{3}\right)^0\left(\frac{1}{3}\right)^{10-0} + \binom{10}{1}\left(\frac{2}{3}\right)\left(\frac{1}{3}\right)^9 + \binom{10}{2}\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^8 + \binom{10}{3}\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^7 \right\}$$

$$\Rightarrow 1 - \left\{ \frac{1 \times 1}{59049} + 10 \times \frac{2}{3} \frac{1}{19683} + 45 \times \frac{4}{9} \times \frac{1}{6561} \right\}$$

$$\Rightarrow 1 - \{0.000012 + 0.0034 + 0.00305)$$

PTO →

$\Rightarrow 1 - (0.0034012 + 0.0305$

$\Rightarrow 1 - (0.0664512)$

$\Rightarrow 0.9335$ Ans:-

(ii) P(Exactly 4 Games)

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

$\Rightarrow \frac{210 \times 16}{59049} = 0.057$. Ans

(iii) P(Exactly 11 games)

$\Rightarrow$ For Exactly 11 games = 0 Ans

(iv) P(6 or more games =

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

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

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

$\Rightarrow 0.23 + 0.26 + 0.16 + 0.87 + 0.017$

$\Rightarrow 0.49 + 0.264$

$\Rightarrow 0.75$ Answer

(1) 3:- part A

From the Given data

⇒ Ungrouped frequency distribution of the data -

No. of children	Tally	Frequency (f)
0	I	1
1	IIII	4
2	IIII III	8
3	IIII IIII I	11
4	IIII III	8
5	IIII	5
6	IIII	4
7	III	3
8	II	2
9	I	1
10	III	3
		Total = 50

Q3 = part B :-

Data of grouped frequency:-

Groups	F (f)
0 - 1	5
2 - 3	19
4 - 5	13
6 - 7	7
8 - 9	3
10 - Above	3
	50

The End

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