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Q1:- Calculate the correlation coefficient 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	167.96	-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.T.O →

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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	10	3.4	-7.2	11.56	133.63	-24.48
13	8	4.4	-9.2	19.36	374.81	40.48
<u>76</u>				<u>82.6</u>	<u>793.2072</u>	<u>-150</u>

For the correlation between  $x$  and  $y$

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

Now:-

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

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

putting values

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

P.T.O.  $\rightarrow$



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

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

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

Q1 part B :-

Answer :- From the Given data -

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
<u>165</u>	<u>114</u>	<u>2099</u>	<u>3309</u>	<u>1604</u>

(4)

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

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

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

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

Putting 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

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

Putting values -



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$$\Rightarrow b = \frac{8 \times 2099 - 165 \times 144}{8 \times 3309 - (165)^2}$$

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

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

$$\Rightarrow b = 0.032$$

So we have:-

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

$\Rightarrow$  part = B

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

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

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

putting values  
PTO  $\rightarrow$

(6)

$$q = \frac{105}{9} - 0.056 \times \frac{114}{9}$$

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

$$q = 18.3 - 0.712$$

$$q = 17.58$$

Now:-

$$\beta = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - \sum x^2}$$

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

putting values

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

$$\Rightarrow b = \frac{18891 - 11870}{14436 - 12996}$$

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



(7)

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

$$b = 0.056$$

Get:-

$$\hat{X} = 17.58 + 0.056y \quad \text{Answer}$$

Q2 part B/-

Predicted value-

From the Given value -

$$\text{For } x = 20 = y = 12.11 + 0.032 \times 20 = 12.75$$

$$\text{For } x = 11 = y = 12.11 + 0.032 \times 11 = 12.46$$

$$\text{For } x = 15 = y = 12.11 + 0.032 \times 15 = 12.59$$

$$\text{For } x = 25 = y = 12.11 + 0.032 \times 25 = 12.91$$

$$\text{For } x = 28 = y = 12.11 + 0.032 \times 28 = 13.006$$

The above are the predicted  
value of  $y$  for  $x$

DT.0

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Now For

the predicted value  
of  $x$  for  $y$  is

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

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

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

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

$$\text{For } y=16 \Rightarrow x = 17.58 + 0.056 \times 16 = 18.416$$

$$\text{For } y=18 \Rightarrow x = 17.58 + 0.056 \times 18 = 18.588$$







# The Sample Space

$$S = \{ \begin{array}{l} HHHHH, HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \\ HHHHT, HHHHT, HHHHT \end{array} \}$$

number of spin  
 $n_s = 32$

lets draw

No of Heads	0	1	2	3	4	5
Number of frequency (f)	1	5	10	10	5	1

P.T.O



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$$\Rightarrow P(X=0) = \frac{1}{32} \text{ --- Ans}$$

$$\Rightarrow P(X=1) = \frac{5}{32} \text{ --- Ans}$$

$$\Rightarrow P(X=2) = \frac{10}{32} \text{ --- Ans}$$

$$\Rightarrow P(X=3) = \frac{10}{32} \text{ --- Ans}$$

$$\Rightarrow P(X=4) = \frac{5}{32} \text{ --- Ans}$$

$$\Rightarrow P(X=5) = \frac{1}{32} \text{ --- Ans}$$

Q2:- part 13:-

From the given data =

$$p = \frac{2}{3}, \quad q = \frac{1}{3}, \quad n = 10$$

$$\begin{aligned} P(\text{At least 4 games}) &= 1 - (P(\text{at most 3 games})) \\ &= 1 - \left\{ \binom{10}{0} \left(\frac{2}{3}\right)^0 \left(\frac{1}{3}\right)^{10-0} + \binom{10}{1} \left(\frac{2}{3}\right)^1 \left(\frac{1}{3}\right)^{10-1} + \binom{10}{2} \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^{10-2} + \binom{10}{3} \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^{10-3} \right\} \end{aligned}$$

$$\Rightarrow 1 - \left\{ \frac{1 \times 1}{59049} + 10 \times \frac{2}{3} \times \frac{1}{19683} \right.$$

$$\left. + 45 \times \frac{4}{9} \times \frac{1}{6561} \right\}$$

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

P.T.O. →

(12)

$$\Rightarrow 1 - (0.0034012 + 0.0805)$$

$$\Rightarrow 1 - (0.0839012)$$

$$\Rightarrow 0.9160988 \text{ Ans :-}$$

(ii)  $\Rightarrow P(\text{Exactly 4 Games})$

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

$$\Rightarrow \frac{210 \times 16}{59049} = 0.57 \text{ Ans}$$

(iii)  $\Rightarrow P(\text{Exactly 91 games})$

$$\Rightarrow \text{For Exactly 91 games} = 0 \text{ Answer}$$

(iv)  $\Rightarrow P(\text{6 or more games}) =$

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

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

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

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

$$\Rightarrow 0.49 + 0.264$$

$$\Rightarrow 0.75 \text{ Answer}$$



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Q 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	<del>IIII</del> III	8
3	<del>IIII</del> <del>IIII</del> I	11
4	<del>IIII</del> III	8
5	<del>IIII</del>	5
6	IIII	4
7	III	3
8	II	2
9	I	1
10	III	3

---

Total = 50

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Q3 = part B :-

Date of grouped frequency -

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

The End

22/06/2020