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# QUESTION NO 1 (A part)

Pg # 1

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

Solution :-

$$N = 10 \quad , \text{ So } \frac{N}{2} = \frac{10}{2} = 5$$

$$\text{So, } u = x - 7 \quad \& \quad v = y - 11$$

$$\text{let } u = x - 7 \quad \text{and } v = y - 19$$

and then find  $r_{xy} = r_{uv}$

x	y	u	v	u <sup>2</sup>	v <sup>2</sup>	uv	
3	25	-4	6	16	36	-25	
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	-10	36	100	-60	
Sum =	76	172	6	-18	94	314	-70

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

$$\sqrt{\left(94 - \left(\frac{6}{10}\right)^2\right) \left(314 - \left(\frac{-18}{10}\right)^2\right)}$$

$$\gamma = \frac{-170 + \frac{108}{10}}{10}$$

$$\sqrt{\left(94 - \frac{36}{10}\right) \left(314 - \frac{324}{10}\right)}$$

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

$$\sqrt{\left(\frac{940 - 36}{10}\right) \left(\frac{3140 - 324}{10}\right)}$$

$$\gamma = \frac{-159.2}{10}$$

$$\sqrt{(90.4)(281.6)}$$

$$\gamma = \frac{159.2}{10}$$

$$\sqrt{25456.6}$$

$$\gamma = \frac{-159.2}{159.5} = -0.998 = \boxed{-0.1}$$

# QUESTION NO1(PART B) Pg 3

Predicted value of  $x$  for  $y$

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

$$x = 4.15 + 1.12 (5)$$

$$y = 5$$

$$\boxed{x = 9.75} \quad (*)$$

$$x = 4.15 + 1.12 (15)$$

$$y = 15$$

$$\boxed{\bar{x} = 2.75}$$

$$\bar{x} = 4.15 + 1.12 (9)$$

$$y = 9$$

$$\boxed{\bar{x} = 17.59}$$

$$\bar{x} = 4.15 + 1.12 (12)$$

$$y = 12$$

$$\boxed{\bar{x} = 17.59}$$

$$\bar{x} = 4.15 + 1.12 (16)$$

$$y = 16$$

$$\boxed{x = 22.09}$$

$$\bar{x} = 4.15 + 1.12 (18)$$

$$y = 18$$

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

Predicted values of  $y$  for

$$x = 20, 11, 15, 25, 28$$

$$y = a + bx$$

$$= 1.11 + 0.62(20) \quad x = 20$$

$$y = 1.11 + 12.6$$

$$\hat{y} = 13.71$$

$$y = 1.11 + 0.63(11) \quad x = 11$$

$$\hat{y} = 10.56$$

$$y = 1.11 + 0.63(13) \quad x = 13$$

$$\hat{y} = 10.56$$

$$y = 1.11 + 0.63(25) \quad x = 25$$

$$\hat{y} = 16.86$$

$$y = 1.11 + 0.63(28) \quad x = 28$$

$$y = 18.75$$

## QUESTION NO 2 (PART A) $P_1 5$

A fair coin is tossed 5 times. Find the probabilities of obtaining various numbers of head  
let us regard the tossing of a coin as experiment. Then we observe that

- 1) Each toss of coin has two possible outcomes, head and tail
- 2) The probability of head success is  $P = 1/2$  and remain the same for successive tosses.
- 3) The successive tosses of the coin are independent
- 4) The coin is tossed 5 times.

Therefore r.v  $X$  which denotes the numbers of head (successes) has a binomial probability distribution with  $P = 1/2$  and  $n = 5$ , the possible values of  $X$  are 0, 1, 2, 3, 4 and 5 hence.

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

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

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

$$P(3 \text{ heads}) = P(X=3) = \binom{5}{3} \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^{5-3} = 10 \times \left(\frac{1}{2}\right)^5 = \frac{10}{32}$$

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

$$P(5 \text{ heads}) = P(X=5) = \binom{5}{5} \left(\frac{1}{2}\right)^5 \left(\frac{1}{2}\right)^0 = 1 \times \left(\frac{1}{2}\right)^5 = \frac{1}{32}$$

Tosses probability can also be obtained by expanding the binomial  $(\frac{1}{2} + \frac{1}{2})^5$  the binomial p.d for number of heads obtained in 5 tosses of fair coin is

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

# QUESTION NO 2 (PART b) Pg 77

Solution here

Therefore the binomial probability distribution with  $n=10$

$$P = 2/3$$

$$q = 1 - P$$

$$q = 1 - 2/3$$

$$q = 1/3$$

Let  $X$  denote the number of non by A then

$$P(X > 4) = 1 - P(X < 4)$$

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

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

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

$$= 1 - \frac{1}{59049} [1 + 20 + 130 + 960]$$

$$= 1 - 0.0197$$

$$P(X > 4) = 0.9803$$



$$\begin{aligned}
 P(x=4) &= \binom{10}{4} \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^6 \\
 &= 216 \left(\frac{16}{81}\right) \left(\frac{1}{729}\right) \\
 &= \frac{3360}{59049}
 \end{aligned}$$

$$P(x=4) = 0.056$$

(iii)  $P(x=11) = f(6) =$  because  $x$  can take only value

0, 1, 2, 3, ..., 10

iv 6 or mo games

$$\begin{aligned}
 P(x=6) &= \sum_{x=6}^{10} \binom{10}{x} \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{10-x} \\
 &= \binom{10}{6} \left(\frac{2}{3}\right)^6 \left(\frac{1}{3}\right)^4 + \binom{10}{7} \left(\frac{2}{3}\right)^7 \left(\frac{1}{3}\right)^3 + \\
 &\quad + \binom{10}{8} \left(\frac{2}{3}\right)^8 \left(\frac{1}{3}\right)^2 + \binom{10}{9} \left(\frac{2}{3}\right)^9 \left(\frac{1}{3}\right)^1 \\
 &\quad + \binom{10}{10} \left(\frac{2}{3}\right)^{10} \left(\frac{1}{3}\right)^0
 \end{aligned}$$

$$P = 0.228 + 0.261 + 0.196 + 0.037 + 0.018$$

$$P(x \geq 6) = 79$$

# QUESTION NO 3 (PART A)

Given Data

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

Uncompiled frequency distribution

No	Tollymarks	frequency	Correlative frequency
0	I	1	1
1	IIII	4	5
2	<del>IIII</del> III	8	13
3	<del>IIII</del> <del>IIII</del> I	11	24
4	<del>IIII</del> III	8	32
5	<del>IIII</del> I	5	37
6	IIII	4	41
7	III	3	44
8	II	2	46
9	I	1	47
10	III	3	50

$N = 50$   $R = 9$  ,  $k = 6$  -  $h = 2$

Class	Frequency	data bonding	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-Freqcy	R-Frequency	C.F	R.C.F
5/50	$5/50 \times 100 = 10$	5	$5/50 = 0$
19/50	$19/50 \times 100 = 38$	24	$24/50 = 0$
13/50	$13/50 \times 100 = 26$	37	$37/50 = 0$
7/50	$7/50 \times 100 = 14$	44	$44/50 = 0$
3/50	$3/50 \times 100 = 6$	47	$47/50 = 0$
3/50	$3/50 \times 100 = 6$	50	$50/50 = 0$



# Q3 (PART B)

Pg 10

Give information of children born 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

$N = 50$  data

$N = 50$        $X_0 = 1$        $X_n = 10$

Range =  $X_m - X_0$

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

$$k = 1 + 3 \cdot 3 \log N$$

$$= 1 + 3 \cdot 3 \log (50)$$

$$= 1 + 3 \cdot 3 (1.698)$$

$$= 1 + 5 \cdot 6066$$

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

$h = \text{class interval} = \frac{\text{Rang}}{k}$

$$h = \frac{9}{6} = 1.285 = \boxed{2}$$

we find out the information from data.