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Program : Bs DT

Date : 22 - 6 - 2020.

Q:- 1 a) 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

x	y
3	25
4	24
5	20
6	20
7	19
8	17
9	16
10	13
11	10
13	8

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

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

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

$$r = \frac{\Sigma (76-7.6)^2 (172-17.2)}{\sqrt{\Sigma (68.4)^2 \Sigma (154.8)^2}}$$

(2)

r. $\frac{10588.32}{11211.2520}$

r $\frac{10588.32}{10588.32}$, 1.00000

→ b) Given the following set of values.

x	20	11	15	10	17	18	21	25	28	
y	5	15	14	17	8	9	12	16	18	

ns.

	x	y	xy
3	20	5	100
4	11	15	165 ✓
5	15	14	210
6	10	17	170
7	17	8	136
8	18	9	162
9	21	12	252
10	25	16	400
4	28	18	504
15	165	14	2099

(3)

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

$$b = \frac{2099 - 165 \times 114}{165^2 - 114^2}$$

$$b = \frac{2099 - 18810}{27225 - 12996}$$

$$b = \frac{-1671}{144229} = \boxed{0.1158644}$$

Q: Determine the equation of the least Squares regression line of Y on x and x on y.

x	y	x^2	y^2	xy
20	5	400	25	100
11	15	121	225	165
15	14	225	196	210
10	17	100	289	170
17	8	289	64	136
18	9	324	81	162
21	12	441	144	252
25	16	625	256	400
28	08	784	324	504
165	114	3309	1604	2099

(4)

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

$$b = \frac{9(2099) - (165)(124)}{9(3309) - (165)^2}$$

$$b = \frac{18891 - 20460}{29781 - 27225}$$

$$b = \frac{-1569}{2556}$$

$$\boxed{b = -0.6}$$

$$a = \frac{\Sigma y - b\Sigma x}{n}$$

$$a = \frac{124 - (-0.6)(165)}{9}$$

$$= \frac{124 - (-99)}{9}$$

$$\boxed{a = 24.7}$$

→ Hence the required regression line is given by

$$y = a + bx$$

$$\Rightarrow y = 24.7 - 0.6x$$

(5)

Regression line x on y

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

$$b = \frac{9(20991) - (165)(124)}{9(1604) - (124)^2}$$

$$b = \frac{18891 - 20460}{14436 - 15376}$$

$$b = \frac{-1569}{-940}$$

$$\boxed{b = 1.7}$$

$$a = \frac{\Sigma x - b\Sigma y}{n} = \frac{165 - (1.7)(124)}{9}$$

$$a = \frac{165 - 210.8}{9}$$

$$a = \frac{-45.8}{9}$$

$$\boxed{a = -5.1}$$

Hence the required regression line is given by

$$\hat{x} = a_1 + by$$

$$\hat{x} = -5.1 + 1.7y$$

Find the product value of
y for x = 20, 11, 15, 25, 28
x for y = 5, 15, 9, 12, 16, 18

$\hat{y} = 24.7 - 0.6x$

$\hat{x} = -5.1 + 1.7y$

x	y	$\hat{y} = 24.7 - 0.6x$	$\hat{x} = 5.1 + 1.7y$
20	5	12.7	3.4
11	15	18.1	30.4
15	9	15.1	10.2
25	12	9.7	15.3
28	16	7.9	32.1
	18		35.5

→ This is the required product value.

Q)
Q:- A fair coin is tossed 5 times. Find the probabilities of obtaining various number of heads.

Sol:- Each coin has two probable results. Probality of getting head. $p = \frac{1}{2}$

(7)

Toss : 5 Time

$P(2 \text{ head and } 1 \text{ tail}) = \left(\frac{5}{2}\right)\left(\frac{1}{2}\right) = \frac{5}{8}$

$P(1 \text{ head and } 2 \text{ tails}) = \frac{5}{1}\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)^2 = \frac{5}{8}$

Probibity of (head $= \frac{5}{8} + \frac{5}{8} = \frac{10}{8} = (1.25)$

2 (b)

APART.

Two posible outcome : wom and Not wm

=) Prob. A winning $P = 2/3$

: 10 gamu

: n's $1P = 2/3$

: Successive gases wom and

Last indypendy win

i) $P(x=4) = \frac{10}{4}\left(\frac{2}{3}\right)^4 (f)^4 = \frac{1128}{5651} = 0.1996$

ii) $P(x>4) = 1 - P(x<4) = 4$ mean 4 omore

$= 1 - \sum^{2} \binom{10}{x}\left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{8-x}$

$= 1 - \left[\left(\frac{1}{3}\right)^{10} + \left[\frac{2}{3}\right]\left(\frac{1}{3}\right) + 28\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^1 + 56\left[\frac{2}{3}\right]^2\left(\frac{1}{3}\right)^3\right]$

$= 1 - \frac{1}{6561}(10+16+28+448)$

$= 1 - \frac{527}{6561} = \frac{5984}{65611} = 0.9121$

$P(x \geq 6) = \sum^{9} \binom{10}{x}\left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{10-x}$

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

$= \frac{100}{6561}(30+16+2) = \frac{100 \times 48}{6561} = \frac{4800}{2187} = 2194$

(B) $P(3 < 1 \leq 6) = \sum^{6} \binom{16}{x} \left(\frac{2}{3}\right)^{x} \left(\frac{1}{3}\right)^{x}$

$= \frac{10}{3}\left(\frac{2}{3}\right)^{3}\left(\frac{1}{3}\right)^{3} + \binom{8}{4}\left(\frac{2}{3}\right)^{4}\left(\frac{1}{3}\right)^{4} + \binom{6}{5}\left(\frac{2}{3}\right)^{5}\left(\frac{1}{3}\right)^{5}$

$= \left(\frac{2}{3}\right)^{3}\left(\frac{1}{10}\right)^{3}(50 + 160 + 240 + 244)$

$= \frac{10 \times 641}{6561}, \frac{6440}{6561} = \boxed{0.98155}$

Q The following give the number of children born to 50 women.

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

1) Construct the ungrouped of frequency distribution of these data.

No	Tally man	Frequency	cumulative freq
0	1	1	1
1	IIII	4	5
2	~~HHT~~ III	8	13
3	~~HHT~~ ~~HHT~~ I	11	24
4	~~HHT~~ III	8	32
5	~~HHT~~	5	37
6	IIII	4	41
7	III	3	44
8	II	2	46
9	1	1	47
10	III	3	50

Q No (3) PART (A)

Q:-3 Given Information of chidern born to 50 women

PART (B)

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

Grouped frequency distribution for given data.

$N = 50 \quad X_0 = 1, \quad X_m = 10$

Range $= X_m - X_0 + 1$

$10 - 1 = \boxed{9}$

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

$= 1 + 3.3 \ (1.695)$

$= 1 + 5.6066$

$K = 6.606 = \boxed{6}$

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

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

We find out the information from data.

N: 50 : R: 9 , K: 6, h: 2

classes	frequency	class boundary	Midpoint
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.

R. frequency	R. frequency	C.f	R.C.f
5/50	5/50 x 100 = 10	5	5/56 = 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°
3/50	3/50 x 100 = 6	50	50/50 = 0°