Name	HaMza
ID	14081
DEPartMEN	MLT (BS) 6th Smstr
PaPER	Bio- statisitic
Submitted to	Sir. ANWER SHAMIM

Iqra National University

Q No. 1

Part No. 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:-

$N = 10$ So $\frac{N}{2} = \frac{10}{2} = 5$.

Let $u = X -$ and $v = y -$

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

(P.T.O)

Q No. 1 (1) (2)

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	2	9	-6
10	13	3	-6	9	36	-18
11	10	4	-9	16	81	-36
13	8	6	-10	36	121	-66
Sum 76	172	6	-18	94	314	-70

QNo. 1 (1) (3)

- Now to find the r

The formula used

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

- Put Formula

$$r = \frac{170 \quad \frac{6 \times (-18)}{10}}{\sqrt{\left[94 - \frac{(6)^2}{10}\right]\left[314 - \frac{(-18)^2}{10}\right]}}$$

$$r = \frac{-170 - \frac{108}{10}}{\sqrt{\left[94 - \frac{36}{10}\right]\left[314 - \frac{324}{10}\right]}}$$

$$r = \frac{-170 - 10.8}{\sqrt{(94 - 3.6)(314 - 32.4)}} = \frac{-159.2}{\sqrt{(90.4)(281.6}}$$

$$r = \frac{-159.2}{\sqrt{25456.6)}} = -\frac{159.2}{159.5}$$

$\boxed{r = -1}$ ANSWER

Q No 1 part (B)

Part (i)

x	y	xy	x^2	y^2
20	5	100	400	25
11	15	165	121	325
15	14	210	225	196
10	17	170	100	289
17	8	306	288	64
18	9	162	324	81
21	12	252	441	144
25	16	400	625	258
28	18	504	784	324
165	114	2269	3309	1604

∴ The regression equation of y on x is

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

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

$$\Rightarrow \quad b = \frac{9(2269) - (165)(114)}{9(3309) - (165)^2}$$

$$\Rightarrow \quad b = \frac{20421 - 18810}{29781 - 27225} = \frac{1611}{2556}$$

$$\Rightarrow \quad \boxed{b = 0.63} \rightarrow (A)$$

Scanned with CamScanner

Q No. 1 (part B) (a) part

$$a = \frac{\Sigma y}{n} - b\left(\frac{\Sigma x}{n}\right)$$

$$a = \frac{114}{9} - 0.63\left(\frac{165}{9}\right)$$

$$a = 18.66 - 0.63(18.33)$$

$$a = 12.66 - 11.55$$

$$a = 1.11$$

∴ Thus regression Eq x on Y

$$\hat{X} = a + b.y$$

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

$$b = \frac{9(2269) - (165)(114)}{9(1604) - (114)^2}$$

$$b = \frac{20421 - 18810}{14436 - 12396}$$

$$b = \frac{1611}{1440}$$

$$\boxed{b = 1.12} \rightarrow \text{B}$$

Q No. 1 part B (a) ③

Thus the celromated regression
ne of x ~~ab~~ on y

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

$$\hat{x} = 4.15 + 1.12y$$

$\boxed{x = 5.27.}$ → part (a).

Q NO. 1 Part (B) (b)

Predicted value of x for y

y = 5, 15, 9, 12, 16, 18

$\bar{x} = 4.15 + 1.12(5)$ $y = 5$

$\boxed{\bar{x} = 9.75}$ (i)

$\bar{x} = 4.15 + 1.12(15)$ $y = 15$

$\boxed{\bar{x} = 20.95}$ (ii)

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

$\boxed{\bar{X} = 17.59}$ (iii) $y = 9$

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

$\boxed{\bar{X} = 17.59}$ (iv) $y = 12$

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

$\boxed{\bar{x} = 22.09}$ (v) $y = 16$

$\bar{X} = 4.15 + 1.12(18)$ $y = 18$.

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

QNo 1 part (B) (b)

Predicted values of y for
x = 20, 11, 15, 25, 28.

$\hat{y} = a + bx$

$= 1.11 + 0.63(20)$ $\quad x = 20$

$\hat{y} = 1.11 + 12.6$

$\boxed{\hat{y} = 13.71}$ — (i)

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

$\boxed{y = 10.56}$ — (ii)

$\hat{y} = 1.11 + 0.63(15)$

$\boxed{\hat{y} = 10.56}$ — (iii) $\quad x = 15$

$\hat{y} = 1.11 + 0.63(25)$

$x = 25$

$\boxed{\hat{y} = 16.86}$ — (iv)

$\hat{y} = 1.11 + 0.63(28)$

$x = 28$

$\boxed{\hat{y} = 18.75}$ → (v)

Q3(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	Tally marks	frequency	Cumulative frequency
0	|	1	1
1	||||	4	5
2	卌 |||	8	13
3	卌 卌 |	11	24
4	卌 |||	8	32
5	卌	5	37
6	||||	4	41
7	|||	3	44
8	||	2	46
9	|	1	47
10	|||	3	50

S	M	T	W	T	F	S

Date 2

N = 50 R = 9 , K = 6 - h = 2

Classes	Frequency	classboundary	Mainpoint
0-1	5	0.5 – 1.5	1
2 - 3	19	1.5 – 3.5	2.5
4 - 5	13	35 - 5.5	4.5
6 - 7	7	55 - 7.5	6.5
8 -9	3	7.5 – 9.5	8.5
10 - 11	3	10.5 – 11.5	11

Total 50

R.frequency	R.frequency	C.f	R.c.f
5/50	5/50×100 = 10	5	5/50 - 0.
19/50	19/50×100 = 38	24	24/50 = 0.
13/50	13/50× 100 = 26	37	37/50 = 0.
7/50	7/50× 100 = 14	44	44/50 = 0.
3/50	3/50× 100 = 6	47	47/50 - 0.
3/50	3/50×100 = 6	50	50/50 = 0.

Scanned with CamScanner

Q3. Give information of children born to 50 women.

Expmt.

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

$N = 50$ $\quad x_0 = 1.$ $\quad x_m = 10$

Range $= x_m - x_0$

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

$K = 1 + 3.3 \log N$

$= 1 + 33 \log (50)$

$1 + 3.3 (1.698)$

$= 1 + 5.6066$

$K = 6.606 = \boxed{6}$

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

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

we find out the information from data.

Q2. (A)

Two possible out comes = win & Notwin

$\Rightarrow$ prob - A wining $p = 2/3$

= 10 games

= $n_2 \quad | p = 213$

= Successive games won and lost Independly

(i) $P(x=4) = \frac{10}{4} \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^4 = \frac{1128}{5651}$

(ii) $p(x \geq 4) = 1 - p(x < 4)$ 4 means 4 ampre

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

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

$= 1 - \frac{1}{6561} (20 + 16 + 28 + 448)$

$1 - \frac{577}{6561} = \frac{5984}{65611} = 0.9121$

$p(x \geq 6) = \sum_{x=b}^{B} \left(\frac{86}{x}\right) \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{-x}$

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

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

Scanned with CamScanner

Q:2 (B)

$$P(3 \le x < 6) = \left(\sum_{x=3}^{6}\right)\left(\frac{16}{9c}\right)\left(\frac{2}{3}\right)^{x}\left(\frac{1}{3}\right)^{-x}$$

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

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

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

$$\frac{10 \times 644}{6561} \quad \frac{6440}{6561} = \boxed{0.98155}$$

Ans (b)

⇒ Two possible out come i.e: A will win or will ~~winning~~ ~~cannot~~ not win.

⇒ probability = A ~~will~~ win ~~winning~~ $p = 2/3$

= 10 games.

= $n =$ $p = 2/3$

⇒ Successive game won & last indipendly

(i) $P(x=4) = \binom{10}{4} \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^4 = \frac{1128}{5651} = 0.1996$

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

$= 1 - \sum_{x=0}^{3} \binom{10}{x} \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{8-x}$

$= 1 - \left[\left(\frac{1}{3}\right) + 10 \left[\frac{2}{3}\right] \left[\frac{1}{3}\right] + 28 \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^2 + 56 \left[\frac{2}{3}\right]^3 \left(\frac{1}{3}\right)^5 \right]$

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

$1 - \frac{577}{6561} = \frac{5984}{6561} = \boxed{0.9121}$

(iii) (Page 11) $P(x \geq 6) = \sum_{x=6}^{8} \binom{8}{x} \left(\frac{2}{3}\right)^{x} \left(\frac{1}{3}\right)^{8-x}$

$= \binom{8}{6} \left(\frac{2}{3}\right)^{6} \left(\frac{1}{3}\right)^{2} \binom{10}{7} \left(\frac{1}{3}\right) + \binom{10}{10} \left(\frac{2}{7}\right)^{10}$

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

$\frac{4800}{2187} = 2.194$

$P(3 \leq x \leq 6) = \sum_{x=3}^{6} \binom{10}{x} \left(\frac{2}{3}\right)^{x} \left(\frac{1}{3}\right)^{8-x}$

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

$= \left(\frac{(2)^{2}}{3^{10}}\right) (60 + 160 + 240 + 244)$

$\frac{10 \times 644}{6561} = \frac{6440}{6561} = \boxed{0.98155}$