Q1# (a)

→ Correlation coeffiecient between x and y.

x	y	xy	x^2	y^2
3	25	75	9	625
4	24	96	16	576
5	20	100	25	400
6	20	120	36	400
7	19	133	49	361
8	17	136	64	289
9	16	144	81	256
10	13	130	100	169
11	10	110	121	100
13	8	104	169	64
76	172	1148	670	3240

As we know that coefficient of correlation $r_{x,y}$

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

OR

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

Continue....

Now we need to find

$\Sigma xy = ?$ $\Sigma x = ?$ $\Sigma y = ?$

$\Sigma x^2 = ?$ $(\Sigma x)^2 = ?$

$\Rightarrow$ $\Sigma xy = 1148$ $\Sigma x^2 = 670$

$\Sigma y^2 = 3240$ $\Sigma x = 76$

$n = 10$ $\Sigma y = 172$

Putting in formula.

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

$$\Rightarrow \frac{(10)(1148) - (76)(172)}{\sqrt{[(10)(670) - (76)^2] (10)(3240) - (172)^2]}}$$

$$r_{xy} = \frac{-1592}{\sqrt{(924)(2816)}}$$

$$r_{xy} = -0.986$$

Continue ----

Interpretation ??

Hence we have the $r_{xy} = -0.986$ which tell us that there is Strong negative Correlation between x and y.

___ x ___ x ___

x ___ x ___ x

x ___ x

Q1 (b) Page (4)

Solution:

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

As we know that for y on x we have

$$\hat{y} = a_{yx} + bx \quad \text{and}$$

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

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

$$b_{yx} = \frac{9(2099)-(165)(114)}{9(3309)-(165)^2} = \boxed{0.03169}$$

$$\boxed{b_{yx} = 0.03169}$$

$$\bar{y} = \frac{114}{9} = 12.66$$

$$\bar{x} \quad \frac{\Sigma x}{n} = \frac{165}{9} = 18.33$$

$$a = 12.66 - (0.3169)(18.33)$$

$$a_{yx} = 12.089017$$

Now the least Square regression line equation of

y and x i's

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

$$\hat{y} = 12.08997 + 0.3169x$$

Continue ...

Now for find the equation of x and y for this we have.

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

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

$$a_{xy} = \bar{x} - b_{xy} \bar{y}$$

By putting values

$$b_{xy} = \frac{9(2099) - (165)(144)}{9(1604) - (114)^2}$$

$$b_{xy} = \frac{8}{1440} = 0.05625$$

$$\boxed{b_{xy} = 0.05625}$$

$$a_{xy} = \frac{165}{9} - (0.05625)\left(\frac{114}{9}\right)$$

$$a_{xy} = 17.6175$$

(Continue ----

Hence the equation of least Square regression here is.

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

$$\hat{x} = 17.6175 + (0.05625)\, y$$

Now to find the predicted values of y can f x.

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

x	$\hat{y}$
20	12.723
11	12.438
15	12.565
25	12.8813
28	12.976

And the predicted values of x for y are given

y	$\hat{x}$
5	17.89875
15	18.46125
9	18.12375
12	18.2925
16	18.5175
18	18.63

Q # 1 Completed.

Q#2 (a)

Solution)) Let us regard the tossing of a coin as an experiment than we observe that

(i) Two possible outcome H or T

(ii) the probability of a head is $p = \frac{1}{2}$ and remains the same for successive tosses.

(iii) the successive tosses of the coin are independent

(iv) the coin is tossed fixed number is 5 times.

therefore the r.v x which denotes the number of heads (successes) has a binomial probability distribution with $p = 1/2$ and $n = 5$.

$q = 1 - 1/2 = 1/2$

The possible value of x are 0, 1, 2, 3, 4, and 5. Hence

$p(\text{no head}) = p(x=0) = \binom{5}{0}\left(\frac{1}{2}\right)^{0}\left(\frac{1}{2}\right)^{5}$

binomial $= p(x=x) = \binom{n}{x}(p)^{x}(q)^{n-x}$

$p(x=0) = 1 \times \left(\frac{1}{2}\right)^{5} = \frac{1}{32}$

$p(x=1) = \binom{5}{1}\left(\frac{1}{2}\right)^{1}\left(\frac{1}{2}\right)^{4} = 5 \times \left(\frac{1}{2}\right)^{5} = 5/32$

$p(x=2) = \binom{5}{2}\left(\frac{1}{2}\right)^{2}\left(\frac{1}{2}\right)^{5-2} = 10 \times \left(\frac{1}{2}\right)^{5} = 10/32$

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$$p(x=3) = \binom{5}{3}\left(\frac{1}{2}\right)^{3}\left(\frac{1}{2}\right)^{5-3} = 10 \times \left(\frac{1}{2}\right)^{5} = \frac{10}{32}$$

$$p(x=4) = \binom{5}{4}\left(\frac{1}{2}\right)^{4}\left(\frac{1}{2}\right)^{5-4} = 5 \times \left(\frac{1}{2}\right)^{5} = 5/32$$

$$p(5\ \text{head}) = p(x=5)\ \binom{5}{5}\left(\frac{1}{2}\right)^{5}\left(\frac{1}{2}\right)^{5-5} = 1 \times \left(\frac{1}{2}\right)^{5}$$

$$= \frac{1}{32}$$

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

Q#2 (b)

Solution))

therefore the Binomial proba distributech with $n=10$

$p = 2/3$

$q = 1 - 2/3 = 1/3$

Let x denote the number of won by A. Then

(i) $p(x \geq 4) = 1 - p(x<4) = 1 - \sum_{x=0}^{3} \binom{10}{x} \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{10-x}$

$= 1 - \left[\left(\frac{1}{3}\right)^{10} + 10\left(\frac{2}{3}\right)^1\left(\frac{1}{3}\right)^9 + 45\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^8 + 120\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^7\right]$

$= 1 - \frac{1}{59049} + 10\left(\frac{2}{3}\right)\frac{1}{19683}) +$

$= \cancel{1}$

$1 - \frac{1}{59049}\left[1 + 20 + 180 + 960\right]$

$1 - 0.0197$

$\boxed{p(x>4) = 0.9803}$

(ii) $p(x=4) = \binom{10}{4}\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^6$

$= 210\left(\frac{16}{81}\right)\left(\frac{1}{729}\right) = \frac{3360}{59049}$

(iii) $p(X=1) = f(0) =$ because

X can take only values

$0, 1, 2 \dots 10$

(iv) 6 or more games

$$p(X \geq 6) = \sum_{x=6}^{10} \binom{10}{x} \left(\frac{2}{3}\right)^{x} \left(\frac{1}{3}\right)^{10-x}$$

$$= \binom{10}{6}\left(\frac{2}{3}\right)^{6}\left(\frac{1}{3}\right)^{4} + \binom{10}{7}\left(\frac{2}{3}\right)^{7}\left(\frac{1}{3}\right)^{3} + \binom{10}{8}\left(\frac{2}{3}\right)^{8}\left(\frac{1}{3}\right)^{2}$$

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

$$= 0.228 + 0.261 + 0.196 + 0.087 + 0.018$$

$$p(X \geq 6) = 0.79$$

End Q#2

Q3 (9)

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

Ungrouped frequency distribution

NO	Tolly marks.	Frequency	C.Freq.
0	|	1	1
1	||||	4	5
2	~~||||~~ |||	8	13
3	~~||||~~ ~~||||~~ |	11	24
4	~~||||~~	8	32
5	||||	5	37
6	|||	4	41
7	||	3	44
8	|	2	46
9	|||	1	47
10		3	50

Q3 (b)

N = 50 R = 9 K = 6 n = 2.

Classes	Frequency	Classbonding	Mainpoint
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	1	5.5 – 7.5	6.5
8 – 9	3	7.5 – 9.5	8.5
10 – 11	3	10.5 – 11.5	11

R. frequency	R. frequency	C.F	R.c.f.
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/~~5~~50	3/50×100 = 6	47	47/50 = 0.
3/50	3/50×100 = 6	50	50/50 = 01

Q3(b) 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.

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

Range $= x_m - x_0$

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

$K = 1 + 3.3 \log n$

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

$= 1 + 3.3\,(1.698)$

$= 1 + 5.6066$

$K = 6.606 = \boxed{6}$

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

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

We find out the information from Date.