(1)

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Q.2=

ANS= (A) Let us regard the tossing of a coin as an experiment.

Then we observe that

1) Each toss of coin has two possible outcomes, head and tail

2) Probability of the head 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 the r.v X which denotes the numbers of heads has a binomial probability distribution with $p = 1/2$ and $n = 5$, the possible value of X are $0, 1, 2, 3, 4$ and 5. hence

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

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

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

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

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

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

These probabilities can also be obtained by expanding the binomial $\left(\frac{1}{2} + \frac{1}{2}\right)$

the binomial p.d for the number of heads obtained in 5 tosses of fair coin is

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

Part (B)

(1) $P(x \geq 4) = ?$

$= 1 - P(x < 4)$

$= 1 - \left[\sum_{x_0} \binom{10}{x} \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{3-x} \right]$

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

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

$\left. + \binom{10}{3} \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^{10-3} \right]$

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

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

$$+ 120\left(2/3\right)^3\left(\frac{1}{3}\right)^7\Big]$$

$$= 1 - [0.0002 + 0.0003 + 0.004 + 0.017]$$

$$= [0.0215]$$

$$P = (x \geq 4) = 0.97$$

(ii) $P(x = 4/10) = ?$

$P(x = 4/10) = f(4/10) = 0$ because a r.v X with a binomial distribution takes only one of the integral values, $0, 1, 2 \ldots n$

(iii)

$P(x = 11) = ?$

$P(x = 11) = f(6) = 0$ because X can take only value

(6)

0, 1, 2 ---- 10.

Q.1 =

Ans =

x	y	x^2	y^2	xy
3	25	9	625	75
4	24	6	576	96
5	20	25	400	100
6	20	36	400	120
7	19	49	361	133
8	17	64	289	136
9	16	81	256	144
10	13	100	169	130
11	10	121	100	110
12	8	144	64	96
75	172	645	3240	1140

$n = 10$, $\Sigma x = 75$, $\Sigma y = 172$

$\Sigma x^2 = 645$, $\Sigma y^2 = 3246$

$\Sigma xy = 1140$

Subtituting in the computing formula for the r given.

$$r = \frac{\Sigma xy - [(\Sigma x)(\Sigma y)]\,n}{\sqrt{[\Sigma x^2 - (\Sigma x)^2/n]\,[\Sigma y^2 - (\Sigma y)^2/n]}}$$

$$r = \frac{1140 - [(75)(172)]/10}{\sqrt{[645 - (75)^2/10][3246 - (172)^2/10]}}$$

$$r = \frac{1140 - 1290}{\sqrt{[645 - 5625/10][3246 - 2958.4]}}$$

$$= \frac{150}{(82.5)(2876)}$$

$$= \frac{-150}{23727}$$

$$= \boxed{-0.01} \text{ Ans.}$$

Q.7 PART (B)

(a) Determine the equation of the least square regression line y on x and x on y.

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x	y	x^2	y^2	xy
20	5	400	25	100
11	15	121	225	165
15	14	225	196	216
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	8	784	324	504
165	124	3309	1604	2099

Regression line y on x

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

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

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

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

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

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

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

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

$$\boxed{a = 24.7}$$

Hence the required regression line is given by

$$y^n = a + bx$$

$$\Rightarrow \boxed{y^n = 247 - 0.6\ x}$$

Regression line X on Y

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

$$b = \frac{9(2099) - (165)(124)}{9(1604 - (124)^2}$$

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

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

$$\boxed{b = 1.7}$$

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

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

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

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

Hence the required regression line is given by

$$x^n = a + by$$

$$\boxed{x^n = -5.1 + 1.7y}$$

Q.1 part B (b)

(B)

Find the predicted value of y for $x = 20, 11, 15, 25, 28$

and

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	20.4
15	9	15.7	10.2
25	12	9.7	15.3
28	16	7.9	22.1
	18		25.5

$\Rightarrow$ This is the required predicted value.

Q.3=

Part (A)

Ans= 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	8	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

Ungrouped data frequency distribution

NO.	Tally mean	frequency	C. frequency
0	1	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

Part (b)

Grouped frequency distribution for given Data.

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

Range $= X_m - X_0$

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

$K = 1.33 \cancel{\log}$ $\log n$

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

$= 1 + 3.3 (1.698)$

$= 1 + 5.6066$

$K = 6.606 = \boxed{6}$

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

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