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PAPER: BIO STATISTIC

EXAM: FINAL

SUBMITTED TO: SIR ANWAR SHAMIM

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QUESTION NO 1

PART : A

X	Y	X^2	y^2	XY
3	25	9	625	75
4	24	16	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	169	64	104
$\Sigma = 76$	$\Sigma = 172$	$\Sigma = 670$	$\Sigma = 3240$	$\Sigma = 1148$

Formula For Correlation Co-efficient.

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

For $n = 10$

$$r = \frac{(10)(1148) - (176)(172)}{\sqrt{\{(10)(670) - (176)^2\}\{(10)(3240) - (172)^2\}}}$$

$$r = \frac{11480 - 13072}{\sqrt{(6700 - 5776)(32,400 - 29584)}}$$

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

$$r = \frac{-1592}{\sqrt{2601984}}$$

$$r = \frac{-1592}{1613.06}$$

$$r = -0.98 \quad \text{Ans}$$

PART B

X	Y	X2	y^2	XY
20	5	400	25	100
11	15	121	225	185
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	18	784	324	504
$\Sigma = 165$	$\Sigma = 114$	$\Sigma = 3309$	$\Sigma = 1604$	$\Sigma = 2099$

(a) Formula For least Square regression line for Y or X

$$y = a + bx$$

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

$$b = \frac{(9)(2099) - (165)(114)}{(9)(3309) - (165)^2}$$

$$b = \frac{18891 - 18810}{29781 - 27225}$$

$$b = \frac{81}{2556}$$

$$\boxed{b = 0.031}$$

Now

$$a = \frac{1}{n}\left\{\Sigma y - b\Sigma x\right\}$$

$$a = \frac{1}{9}\left\{114 - (0.031)(165)\right\}$$

$$a = \frac{1}{9}\left\{114 - 5.115\right\}$$

$$a = \frac{1}{9}\left\{108.8\right\}$$

$$\boxed{a = 12.09}$$

Hence

$$y = a + bx$$

$$\boxed{Y = 12.09 + 0.031x}$$

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least Square regression line

For x as y

$x = a + by$

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

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

$$b = \frac{18891 - 18810}{14436 - 12996}$$

$$b = \frac{81}{1440}$$

$$b = 0.056$$

Now

$$a = \frac{1}{n}\{\Sigma x - b\Sigma y\}$$

$$a = \frac{1}{9}\{165 - (0.056)(114)\}$$

$$a = \frac{1}{9}\{165 - 6.384\}$$

$$a = \frac{1}{9}\{158.6\}$$

$$a = 17.62$$

Hence $X = a + by$

$$\boxed{X = 17.62 + 0.056y}$$

(b)

X	Y	$Y = 12.09 + 0.031X$	$X = 17.62 + 0.056Y$
20	5	$= 12.09 + (0.31)(20) = 12.71$	$= 17.62 + 0.056(5) = 17.9$
11	15	$= 12.09 + (0.031)(11) = 12.4$	$= 17.62 + 0.056(15) = 18.4$
15	14	$= 12.09 + (0.031)(15) = 12.5$	$= 17.62 + 0.056(9) = 18.1$
10	17	$= 12.09 + (0.031)(25)$	$17.62 + 0.056(12) = 18.2$
17	8	$= 12.8$	
18	9	$= 12.09 + (0.031)$	$17.62 + 0.056(16) =$
21	12	$(28) = 12.9$	$17.62 + 0.056(18) = 18.6$
25	16		
28	18		

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Q:- No 2

Ans:-

PART : A

(a) $n = 5$

Let X denotes number of heads

$X = 0, 1, 2, 3, 4, 5$

By using Binomial distribution

$$P(x = r) = {}^{n}C_{r}\, p^{r} q^{n-r}$$

$$\boxed{P = 2/3}$$

, $q = 1 - p$

$$q = 1 - 2/3$$

$$q = \frac{1}{1} - \frac{2}{3}$$

$$q = \frac{3-2}{3} = 1/3$$

$$\boxed{q = 1/3}$$

$$P(x=0) = {}^{5}C_{0} \times \left(\frac{2}{3}\right)^{0} \left(\frac{1}{3}\right)^{5-0}$$

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

$$P(x=1) = {}^{5}C_{1} \left(\frac{2}{3}\right)^{1} \left(\frac{1}{3}\right)^{5-1}$$

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

$$= \frac{5}{32}$$

$$P(x=2) = \binom{5}{2} \left(\frac{2}{3}\right)^{2} \left(\frac{1}{3}\right)^{5-2}$$

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

$$= \frac{10}{32}$$

$$P(x=3) = \binom{5}{3} \left(\frac{2}{3}\right)^{3} \left(\frac{1}{3}\right)^{5-3}$$

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

$$P(x=3) = \frac{10}{32}$$

$$P(x=1) = \binom{5}{4} \left(\frac{2}{3}\right)^{4} \left(\frac{1}{3}\right)^{5-4}$$

$$P(x=4) = \binom{5}{4} \left(\frac{2}{3}\right)^{4} \left(\frac{1}{3}\right)^{1}$$

$$= \frac{5}{32}$$

$$P(x=5) = \binom{5}{5} \left(\frac{2}{3}\right)^{5} \left(\frac{1}{3}\right)^{5-5}$$

$$= \left(\frac{5}{5}\right)\left(\frac{2}{3}\right)^5\left(\frac{1}{3}\right)^0$$

$$P(x=5) = \frac{1}{32}$$

Hence.

probability of various heads

x	0	1	2	3	4	5
P(x)	1/32	5/32	10/32	10/32	5/32	1/32

Ans.

PART: B

Hence-

Therefore the binomial distribution with $n=10$

$p = 2/3$

$q = 1-p$

$q = 1 - 2/3$

$q = 1/3$

let x denote the number of won by A then.

(i) $P(X \geq 4) = 1 - P(X < 4)$

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

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

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

$1 - 0.0197$

$\boxed{P(X \geq 4) = 0.9803}$

(ii) $P(x = 4) = \left[\frac{10}{4}\right]\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^6$

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

$= \frac{3360}{59049}$

$\boxed{P(x = 4) = 0.056}$

(iii) $P(x=11) = f(0) =$
because x can take only value
0, 1, 2, 3 ..... 10.

(iv) 6 or more games

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

$$= \binom{10}{6}\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^4 + \binom{10}{7}\left(\frac{2}{3}\right)^9\left(\frac{1}{3}\right)^3 + \binom{10}{8}\left(\frac{2}{3}\right)^8\left(\frac{1}{3}\right)^2 + \binom{10}{9}\left(\frac{2}{3}\right)^9\left(\frac{1}{3}\right)^1$$

$= 0.228 + 0.261 + 0.087 + 0.013$

$$\boxed{P(x \geq 6) = 0.79}$$

QUESTION No 3

Ans:-

PART A:-

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	5	3	3	9	2	2

(a) Constract in grouped Frequancy distribution of these data.

6:

X	f
0	6
1	4
2	8
3	11
4	7
5	5
6	4
7	3
8	2
9	1
10	3

PART : B :

(b) Group Frequancy distribution

classes	f
0-2	5
2-4	19
4-6	12
6-8	7
8-10	3
10-11	3