Now

As we know that

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

putting the values.

$$r = \frac{-170 - \frac{(6)(-18)}{10}}{\sqrt{\left[96 - \frac{(6)^2}{10}\right]\left[314 - \frac{(-18)^2}{10}\right]}}$$

$$r = \frac{-170 + \frac{108}{10}}{\sqrt{\left[96 - \frac{36}{10}\right]\left[314 - \frac{(324)}{10}\right]}}$$

$$r = \frac{-170 + 10.8}{\sqrt{(96 - 3.6)(314 - 32.4)}}$$

$$r = \frac{-159.2}{\sqrt{26019.84}}$$

$$r = \frac{-159.2}{161.30}$$

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

1

1.

NAME = AimAN OrAKZAI
IDNO = 13613
subject = Biostatistic.

(a) Calculate the Correlation between x and Y.

X	3	4	5	6	7	8	9	10	11	13
Y	25	24	20	20	19	17	16	18	10	8

Solution:-
Let us change the origin of x and Y
Hence
$U = x - 7$ and $v = y - 19$ Then $r_{xy} = r_{uv}$.
The calculation need to find r are give below.

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	4	9	-6
10	13	3	-6	9	36	-18
11	10	4	-9	16	81	-36
13	8	6	-11	36	121	-66
76	172	6	-18	96	314	-170

(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

(a) Determine the equation of least square regression.

Solution.

least square regression are given below:

x	y	x^2	y^2	xy
20	5	400	25	100
11	15	121	225	105
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
165	114	3309	1604	2099

The estimat linear regression line y on x is

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

where a and b are the least square estimate of the parameter α and β respectively and are given by

As we know that:.

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

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

Substituting the sum, we get putting the values.

$$b = \frac{(9)(2099) - (165)(114)}{(9)(3309) - (27225)}$$

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

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

$$b = 0.031$$

Hence

As we know that

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

Putting values.

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

$a = 12.66 - 0.568$

$a = 12.09$

$Y = 12.09 + 0.031$ Ans.

The estimate linear regression line X on Y

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

As we know that

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

Putting the values.

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

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

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

$b = 0.056$

Hence

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

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

$a = 18.33 - 0.709$

$a = 17.62$ Ans.

(b) Find the predicated values of $x = 20, 11, 15, 25, 28$ and x for $y = 5, 15, 9, 12, 16, 18$.

Sol:.

predicated values of $Y = 20, 11, 15, 25, 28$

Thus $X =$

As we know that

$\bar{Y} = 12.09 + 0.031(20)$

$\bar{Y} = 12.09 + 0.62$

$\bar{Y} = 12.71$

$\bar{Y} = 12.09 + 0.031(11)$

$\bar{Y} = 12.09 + 0.341$

$\bar{Y} = 12.43$

$\bar{Y} = 12.09 + 0.031(15)$

$\bar{Y} = 12.09 + 0.465$

$\bar{Y} = 12.55$

$\bar{Y} = 12.09 + 0.031(25)$

$\bar{Y} = 12.09 + 0.775$

$\bar{Y} = 12.86$.

$\bar{y} = 12.09 + 0.031\ (28)$

$\bar{y} = 12.09 + 0.86$

$\bar{y} = 12.95$

predicated values of $x = 5, 15, 9, 12, 16, 18$.

As we know that

$\bar{x} = 17.62 + 0.056\ (5)$
$\bar{x} = 17.62 + 0.28$
$\bar{x} = 17.9$

$\bar{x} = 17.62 + 0.056 (15)$
$\bar{x} = 17.62 + 0.84$
$\bar{x} = 18.46$

$\bar{x} = 17.62 + 0.056 (12)$
$\bar{x} = 17.62 + 0.50$
$\bar{x} = 18.1$

$\bar{x} = 17.62 + 0.056\ (16)$
$\bar{x} = 17.62 + 0.89$
$\bar{x} = 18.5$

$\bar{x} = 17.62 + 0.056 (18)$
$\bar{x} = 17.62 + 1.008$
$\bar{x} = 18.6$

Q2 (a) Page 8

A fair coin is tossed 5 times. Find the Probability of obtaining velious number of blood.

Solution:-

(i) toss of coin (i.e each trial) has two possible outcomes, head (sucess) and tails (Failure)

The Probability of a head (sucess)

is $p = \frac{1}{2}$ and remains the same for successive tosses.

(iii) the successive tosses of the coin are independent and.

(iv) the coin is tossed 5 times.

Therefore the r.v x which denotes the numbers of heads (success) has a binomial Probability distribution with $p = 1/2$ and $n = 5$, The Possible value of x are 0, 1 2, 3, 4, 5

Hence

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

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

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

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

$$P(4\text{ head}) = P(x=4) = \left[\frac{5}{4}\right]\left[\frac{1}{2}\right]^4\left(\frac{1}{2}\right)^{5-4} = 5 \times \left[\frac{1}{2}\right]^5 = \frac{5}{32}$$

p (5 head) $= P(x=5) = \begin{bmatrix} 5 \\ 5 \end{bmatrix} \left[\frac{1}{2}\right]^5 \left[\frac{1}{2}\right]^0 = 1 \times \left[\frac{1}{2}\right]^5 = \frac{1}{32}$

These Probabilites can be obtained by expanding the binomial $\left[\frac{1}{2} + \frac{1}{2}\right]^5$

The binomial probability distribution for the number of heads obtained in 5 tosses of a fair coin is

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

(b) There fore the binomial probability distribution

$n = 10$
$p = 2/3$
$q = 1-p$
$q = 1-2/3$

x denoted the number of won by A then

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

$$1 - \sum_{x=0}^{3} \binom{10}{x}\left(\frac{2}{3}\right)^{x}\left(\frac{1}{3}\right)^{9} + 45\left(\frac{2}{3}\right)^{2}\left(\frac{1}{3}\right)^{8} + 120\left(\frac{2}{3}\right)\left(\frac{1}{3}\right)^{7}\Big]$$

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

$$1 - 0.0197$$

$$P(x \geq 4) = 0.9803$$

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

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

$$= \frac{3360}{59049}$$

$$P(x=4) = 6.056$$

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

$0, 1, 2, 3 \ldots 10$

(iv) 6 or more games

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

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

$$^{12}\binom{10}{10}\left(\frac{2}{3}\right)^{10}\left(\frac{1}{3}\right)^{0}$$

$0.228 + 0.261 + 0.196 + 0.087 +$
0.018

$$P(x \geq 6) = 0.79 \text{ Ans.}$$

Q3 (a) Construct the ungroup frequency distribution of three data.

Solution.

No of children	No of women	CF	Tally
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	|||
Total	50		

(b) Constract the group frequency distribution.

Solution.

we find out

1 = frequency
2 = C frequency
3 = Boundaries
4 . Class Mark.

Finding class interval $n = 50$

x mini $= 0$

x max $= 10$

$$x = \frac{10}{5} = 2$$

Class interval $= 2$

Class	Entairs	F	C.F	Class Boundaries	Mid Ma
0 - 2	0,1,1,1,1,2,2 2,2,2,2,2,2	13	13	0.5 - 2.5	1
2 - 5	3,3,3,3,3,3,3,3,3,3,3 4,4,4,4,4,4 4,4,5,5,5,5,5	24	37	2.5 - 5.5	4
6 - 8	4,4,4,4,7,7 7,8,8	9	46	5.5 - 8.5	7
9 - 11	9, 10,10,10	4	50	8.5 - 11.5	10
Total		50			