Saifullah khan

ID 14068

Semister 6th

Paper Statistics

Dept BS Radiology.

Q No 2

Solution (a)

As we know that Correlation Coefficient is given by

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

Now we have to calculate the above values for which we have

	x	y	xy	x^2	y^2
1	3	25	75	9	625
2	4	24	96	16	576
3	5	20	100	25	400
4	6	20	120	36	400
5	7	19	133	49	361
6	8	17	136	64	289
7	9	16	144	81	256
8	10	13	130	100	169
9	11	10	110	121	100
10	13	8	104	169	64
	76	172	1148	670	3240

$\Sigma x = 76$, $\Sigma y = 172$, $\Sigma xy = 1148$, $\Sigma x^2 = 670$

$\Sigma y^2 = 3240$ Also $(\Sigma x)^2 = 5776$ $(\Sigma y)^2 = 29584$

and $n = 10$ put all values in the formula

(3)

So we get

$$r = \frac{10(1165) - (76)(172)}{\sqrt{[10(620) - (5776)][10(3240) - (29584)]}}$$

$$= \frac{11650 - 13072}{\sqrt{[924][2816]}}$$

$$= -\frac{1542}{\sqrt{924}\sqrt{2816}}$$

Calculate further required correlation

(25)

Q.No 1 (ii) (1)

Solution The regression line y on x is given by $\hat{y} = a + bx \rightarrow (i)$

in which $a = \bar{y} - b\bar{x}$ (Intercept $\rightarrow$ (i)

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

hence we have

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

$\Sigma x = 165$, $\Sigma y = 114$, $\Sigma xy = 2099$

$\Sigma x^2 = 3309$, $(\Sigma x)^2 = 27225$ $(\Sigma y)^2 = 12996$

here as $n = 9$. $\Sigma y^2 = 1604$.

put all these values in (ii)

(2)

$$b = \frac{9(2079) - (165)(114)}{9(3309) - (27225)}$$

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

$$b = \frac{81}{2556} \Rightarrow \boxed{b = 0.03}$$

Now we have

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

where as $\bar{y} = \frac{114}{9} = 12.6$

$$\bar{x} = \frac{165}{9} = 18.3$$

So

$$a = 12.6 - (0.03)(18.3) = 12.05$$

from (*)

Since The regression line of y on x is

$$\boxed{\hat{y} = 12.05 + 0.03x}$$

(3)

Now regression line x on y is given by

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

where

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

So $$b = \frac{9(7099) - (165)(114)}{9(1604) - (12996)}$$

$$= \frac{18891 - 18810}{14436 - (12996)}$$

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

$$\boxed{b = 0.06}$$

also we have $a = \bar{y} - b\bar{x}$

Since $a = 12.6 - (0.06)(18.3)$

$a = 11.54$

So Regression line of x on y is

$$\boxed{\hat{x} = 11.54 + 0.06y}$$

Q No:2:- Part "a"

(a) A fair coin is tossed 5 times Find the probabilities of obtaining various Number of heads?

Solution:-

if tossed a coin and continue until you make a table with possible value beginning with HHHHH and ending with TTTTT.

H H H H H
H H H H T
H H H T H
H H H T T
H H T H H
H H T H T
H H T T H
H H T T T
H T H H H
H T H H T
H T H T H

HTHTT

HTTHH

HTTHT

HTTTH

HTTTT

THHHH

THHHT

THHTH

THHTT

THTHH

THTHT

THTTH

THTTT

TTHHH

TTHHT

TTHTH

TTHTT

TTTHH

TTTHT

TTTTH

TTTTT

These 32 values obtain from 2^n formal

Possible outcomes

$$2^5 = 32$$

if you will have 32 outcomes possible.

By guising from the previous values

5 heads $\frac{1}{32}$

4 heads $5/32$

3 heads $10/32$

2 heads $10/32$

0 heads $1/32$

$1 + 5 + 10 + 10 + 5 + 1 = 32$

Total outcomes

* = * =

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

Question 2 (Part B)

Given Data:-

Two possible outcomes
Head or tail

⇒ Prob of Head $p = 2/3$

⇒ 10 game

⇒ $n = 4$ $p = 2/3$

Successive game won and lost independently

Solution:

(i) $P(x=4) = {}^{10}C_4 (2/3)^4 (1/3)^4$

$= \frac{1128}{5651} = \boxed{0.1996}$

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

$= 1 - \sum_{x=0}^{3} {}^{10}C_x (2/3)^x (1/3)^{8-x}$

$= 1 - [(1/3)^{10} + 10[2/3][1/3]$
$+ 28(2/3)^2 (1/3)^8 + 56[2/3]^3 (1/3)^3]$

$$= 1 - \frac{1}{6561}(10 + 16 + 28 + 448)$$

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

(iii) $P(x \geq 6) = \sum_{x=6}^{8} \binom{10}{x} (2/3)^x (1/3)^{10-x}$

$$= {}^{10}C_6 (2/3)^6 (1/3)^2 + ({}^{10}C_7)(2/3)^7 (1/3)$$

$$+ \binom{10}{10} (2/3)^{10}$$

$$= \frac{180}{6561}(30 + 16 + 2)$$

$$= \frac{180 \times 48}{6561} = 2194$$

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

$$= {}^{10}C_3 (2/3)^3 (1/3) + ({}^{8}C_4)(2/3)^4 (1/3)^4$$

$$+ ({}^{10}C_3)(2/3)^5 (1/3)^3 + ({}^{10}C_6)(2/3)(1/3)^2$$

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

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

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	6	7
7	5	6	5	1	2	3	9	2	2

uncomplete frequency distribution.

No	Tally mark	frequency	C. frequency
1	I	1	1
2	IIII	4	5
3	IIII III	8	13
4	III IIII I	11	24
5	IIII III	8	32
6	IIII	5	37
7	IIII	4	41
8	III	3	44
9	II	2	46
	I	1	47
10	III	3	50

Q3 Give information of children born to 50 women

B Part:

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	8	2	2

group frequancy distribution for given data

$N = 50$

$N = 50 \quad x_0 = 1 \quad x_n = 10$

$R = 10 - 1 = 9$

$K = 1 + 3.3 \log N$

$K = 1 + 5.6066$

$K = 6.6 = \boxed{6}$

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

$h = 9/7 = 2$

we find the information from Peter

$N = 50 \quad R = 9 \quad K = 6 \quad h = 2$

classes	Frequency	class boundries	Mean point
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	7	5.5 - 7.5	6.5
8-9	3	7.5 - 9.5	8.5
10-11	3	9.5 - 11.5	11

R.f	R. frequency	c.f	R.c.f
5/50	$5/50 \times 100 = 10$	5	$5/50 = 0.$
19/50	$19/50 \times 100 = 38$	24	$24/50 = 0.$
13/50	$13/50 \times 100 = 26$	37	$37/50 = 0.1$
7/50	$7/50 \times 100 = 14$	44	$47/50 = 0.$
3/50	$3/50 \times 100 = 6$	47	$50/50 = 1$
3/50	$3/50 \times 100 = 6$	50	