

SYED HANAYOUN

ID no; 13887

BS (D.T) 6<sup>th</sup> SEM

Subject Biostatistics

SIR ANWAR SHAMIM.

X	Y	X <sup>2</sup>	Y <sup>2</sup>	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
13	8	169	64	104

$\Sigma = 76$      $\Sigma = 172$      $\Sigma = 670$      $\Sigma = 3240$      $\Sigma = 1148$

Formula for Correlation Coefficient

$$r = \frac{n \Sigma XY - \Sigma X \Sigma Y}{\sqrt{\{n \Sigma X^2 - (\Sigma X)^2\} \{n \Sigma Y^2 - (\Sigma Y)^2\}}}$$

$$\sqrt{\{n \Sigma X^2 - (\Sigma X)^2\} \{n \Sigma Y^2 - (\Sigma Y)^2\}}$$

For n=10

$$r = \frac{(10)(1148) - (76)(172)}{\sqrt{\{(10)(670) - (76)^2\} \{(10)(3240) - (172)^2\}}}$$

$$r = \frac{11480 - 13072}{\sqrt{(6700 - 5776)(32400 - 29584)}}$$

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

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

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

$$r = -0.98$$

Ans.

End QA part (a)

X	Y	X <sup>2</sup>	Y <sup>2</sup>	XY
20	5	400	25	100
11	15	121	225	165
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
$\Sigma=165$	$\Sigma=114$	$\Sigma=3309$	$\Sigma=1604$	$\Sigma=2099$

Formula for Least square regression line for Y on X

$$Y = a + bX$$

$$b = \frac{n \Sigma XY - \Sigma X \Sigma Y}{n \Sigma X^2 - (\Sigma X)^2}$$

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

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

Pg-04

page=4

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

$$b = 0.031$$

Now

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

$$a = \frac{1}{9} \{ 114 - (0.031)(115) \}$$

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

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

$$a = 12.09$$

Hence  
 $y = a + bx$

$$y = 12.09 + 0.031x$$

Least square regression line  
for  $X$  on  $Y$

$$X = a + by$$

$$b = \frac{n \sum XY - \sum X \sum Y}{n \sum Y^2 - (\sum Y)^2}$$

$$b = \frac{(9)(2099) - (165)(114)}{(9)(1804) - (114)^2}$$

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

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

$$b = 0.056$$

Now ∴

$$a = \frac{1}{n} \{ \sum X - b \sum Y \}$$

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

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

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

$$a = 17.62$$

Hence

$$X = a + by$$

$$X = 17.62 + 0.056y$$

(b)

X	Y	$Y = 12.09 + 0.0312x$	$X = 17.62 + 0.056y$
20	5	$= 12.09 + (0.031)(20) = 12.71$	$= 17.62 + 0.056(5) = 17.9$
11	15	$= 12.09 + (0.031)(11) = 12.4$	$= 17.62 + 0.056(15) = 18.4$
15	14	$= 12.09 + (0.031)(15) = 12.5$	$17.62 + 0.056(14) = 18.1$
10	17	$= 12.09 + (0.031)(25) = 12.8$	$17.62 + 0.056(17) = 18.2$
17	8	$= 12.09 + (0.031)(28) = 12.9$	$17.62 + 0.056(18) = 18.5$
18	9		$17.62 + 0.056(18) = 18.6$
21	12		
25	16		
28	18		

Q1 End

Q2 part (a)

~~X~~

Pg-07

(2)  $n = 5$

let  $X$  denotes number of heads

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

By using Binomial dist<sup>n</sup>

$$P(X=x) = {}^n C_x P^x q^{n-x}$$

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

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

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

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

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

$$P(X=0) = {}^5 C_0 \left(\frac{2}{3}\right)^0 \left(\frac{1}{3}\right)^{5-0}$$

$$= \frac{1}{3^5}$$



$$P(X=1) = {}^5C_1 \left(\frac{2}{3}\right)^1 \left(\frac{1}{3}\right)^{5-1}$$

$$= {}^5C_1 \left(\frac{2}{3}\right) \left(\frac{1}{3}\right)^4$$

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

$$P(X=2) = {}^5C_2 \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^{5-2}$$

$$= {}^5C_2 \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^3$$

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

$$P(X=3) = {}^5C_3 \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^{5-3}$$

$$= {}^5C_3 \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^2$$

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

$$P(X=4) = {}^5C_4 \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^{5-4}$$

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

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

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

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

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

Hence

prob of various heads

$X$	0	1	2	3	4	5
$P(X)$	$\frac{1}{32}$	$\frac{5}{32}$	$\frac{10}{32}$	$\frac{10}{32}$	$\frac{5}{32}$	$\frac{1}{32}$

Ans

End Q2 (a)

Q<sub>2</sub>: part (b) (X) Pg-10

prob. of winning player A

$$P = \frac{2}{3} \text{ and } q = 1 - P$$

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

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

(b) at least 4 games

$$P(X \geq 4) = \text{~~P(X=5)~~}$$

$$\begin{aligned} & P(X=4) + P(X=5) + P(X=6) \\ & + P(X=7) + P(X=8) + P(X=9) \\ & + P(X=10) \\ & = 0 \end{aligned}$$

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

$$\begin{aligned} & = 1 - \{ P(X=0) + P(X=1) + P(X=2) \\ & \quad + P(X=3) + P(X=4) \} \end{aligned}$$

Q2 part (b)

(X)

Pg-11

(1)

$$P(X \geq 4) = 1 - \left\{ \left(\frac{1}{3}\right)^{10} + (10) \left(\frac{2}{3}\right) \left(\frac{1}{3}\right)^9 + (45) \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^8 \right. \\ \left. + (120) \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^7 + \dots \right\}$$

$$= 1 - \left\{ \frac{1}{59049} + \frac{20}{59049} + \frac{180}{59049} + \frac{96}{59049} \right\}$$

$$P(X \geq 4) = 1 - \frac{(1 + 20 + 180 + 96)}{59049}$$

$$= 1 - \frac{1161}{59049}$$

$$= 1 - 0.019$$

$$P(X \geq 4) = 0.98$$

A.

$$(ii) P(X = \frac{4}{10}) = 0$$

that is impossible prob.

Hence impossible prob. = 0

$$(iii) P(X = 11) = ?$$

Hence  $X = 11$  is not include in this range because that is impossible impossible prob. = 0

$$(iv) P(X \geq 6) = \binom{10}{6} \left(\frac{2}{3}\right)^6 \left(\frac{1}{3}\right)^{10-6} + \binom{10}{7} \left(\frac{2}{3}\right)^7 \left(\frac{1}{3}\right)^3$$

$$+ \binom{10}{8} \left(\frac{2}{3}\right)^8 \left(\frac{1}{3}\right)^{10-8} + \binom{10}{9} \left(\frac{2}{3}\right)^9 \left(\frac{1}{3}\right)^{10-9}$$

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

=

$$\begin{aligned}
 P(X \geq 6) &= 210 \left(\frac{2}{3}\right)^{10} \left(\frac{1}{3}\right)^0 + (120) \left(\frac{2}{3}\right)^7 \left(\frac{1}{3}\right)^3 \\
 &+ (45) \left(\frac{2}{3}\right)^8 \left(\frac{1}{3}\right)^2 + (10) \left(\frac{2}{3}\right)^9 \left(\frac{1}{3}\right)^1 + \\
 &(1) \left(\frac{2}{3}\right)^{10} \left(\frac{1}{3}\right)^0
 \end{aligned}$$

$$\begin{aligned}
 P(X \geq 6) &= \frac{13440}{59049} + \frac{15360}{59049} + \frac{11520}{59049} \\
 &+ \frac{5120}{59049} + \frac{1024}{59049}
 \end{aligned}$$

$$P(X \geq 6) = \frac{46464}{59049}$$

$$P(X \geq 6) = 0.78$$

End Q2 part (b)

2	6	11	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
10	4	2	4	4	4	6	8	10	7
7	5	6	5	3	2	3	9	2	2

② Construct ungrouped frequency dist<sup>n</sup> of these data.

x	f	Rough work
1	4	2-4
2	8	5-7
3	11	8-11
4	7	1-3 4-6 7-9
5	5	2-4
6	4	4-6
7	3	6-8
8	2	8-10
9	1	1-3 3-5 5-7 7-9 8-10
10	3	8-10

End part of Q3

Q3:  $\rightarrow$  Part (b) Pg-16

Grouped frequency distribution

<u>Classes</u>	<u>Frequency</u>
0-2	5
2-4	19
4-6	12
6-8	7
8-10	3
10-11	3