NAME = Tayyab
ID = 14077
Program = BS (radiology)
Submited = Sir shameem
Subject = Biostate.
Date = 22.6.2020.

Q #1(a)

X	Y	$x-\bar{x}$	$y-\bar{y}$	$(x-\bar{x})^2$	$(y-\bar{y})^2$	$(x-\bar{x})(y-\bar{y})$
3	25	-4.6	7.8	21.16	60.84	-35.88
4	24	-3.6	6.8	12.96	167.96	-24.48
5	20	-2.6	2.8	6.67	7.84	-7.28
6	20	-1.6	2.8	2.56	7.24	-4.48
7	19	-0.6	1.8	0.36	3.24	-1.08
8	17	0.4	-0.2	0.16	0.0256	-0.08
9	16	1.4	-1.2	1.96	3.8416	-1.68
10	13	2.4	-4.2	5.76	33.18	-10.08
11	10	3.4	-7.4	11.56	133.63	-24.48
13	8	4.4	-9.2	19.36	374.81	-40.48
				82.6 Total	793.2072 Total	-150 Total

Coefficient of correlation b/w "x" and "y" $= \dfrac{\Sigma(x-\bar{x})(y-\bar{y})}{\sqrt{\Sigma(x-\bar{x})^2\Sigma(y-\bar{y})^2}}$

$\bar{x} = \dfrac{76}{10} = 7.6, \quad \bar{y} = \dfrac{172}{10} = 17.2$

$r = \dfrac{-150}{\sqrt{82.6 \times 793.2072}} \Rightarrow \dfrac{-150}{\sqrt{65518.913}} \Rightarrow \dfrac{-150}{255.97} \Rightarrow \boxed{-0.58}$ Ans.

$(r = 0.58)$

Q # 1(b)

Part(a)

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

(a) Regression line of X on ~~and~~ $X = a+bx$

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

$a = \bar{y} - b\bar{x}$; $b = \dfrac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$

$a = \dfrac{114}{9} - 0.032 \times \dfrac{165}{9}$ $b = \dfrac{9 \times 2099 - 165 \times 114}{9 \times 3309 - (165)^2}$

$a = 12.7 - 0.59$

$a = 12.11$ $b = \dfrac{18891 - 18810}{29781 - 27225} = \dfrac{81}{2556} = 0.032$

$\boxed{\hat{Y} = 12.11 + 0.032}$ $(b = 0.032)$

QNo # 1(b) Page # 2.

part (b)

Regression line X on $y = a + by$.

$$\hat{X} = a + by \quad \text{---} (*)$$

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

$a = \frac{165}{9} - 0.056 \times \frac{114}{9}$.

$a = 18.3 - 0.056 \times 12.7$.

$\boxed{a = 17.58}$

$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \sum y^2}$.

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

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

$b = \frac{81}{1440} = 0.056$

$\boxed{b = 0.056}$

$\boxed{\hat{X} = 17.58 + 0.056}$.

[redacted]

QNo # 1(b) predicted values.

part (c)

For $x = 20 \Rightarrow y = 12.11 + 0.032 \times 20 = 12.75$

For $x = 11 \Rightarrow y = 12.11 + 0.032 \times 11 = 12.46$.

for $x = 15 = y = 12.11 + 0.32 \times 15 = 12.59$

for $x = 25 = y = 12.11 + 0.32 \times 25 = 12.91$.

for $x = 28 = y = 12.11 + 0.32 \times 28 = 13.006$.

Now

for $y = 5 \Rightarrow x = 17.58 + 0.056 \times 5 = 17.86$

for $y = 15 \Rightarrow x = 17.58 + 0.056 \times 15 = 18.42$.

for $y = 9 \Rightarrow x = 17.58 + 0.056 \times 9 = 18.084$

for $y = 12 \Rightarrow x = 17.58 + 0.056 \times 12 = 18.252$.

for $y = 16 \Rightarrow x = 17.58 + 0.056 \times 16 = 18.476$.

for $y = 18 \Rightarrow x = 17.58 + 0.056 \times 18 = 18.588$.

(end Q.)

Q # 2(a)

Ans: Therefore the "x" which denotes the number of heads has a binomial probaility distribution with $p = \frac{1}{2}$ and $n = 5$. the possible value of "x" are 0, 1, 2, 3, 4 and 5.

hence

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

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

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

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

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

$P(5\ \text{head}) = P(x=5) = \binom{5}{4}\left(\frac{1}{2}\right)^5\left(\frac{1}{2}\right)^0 = 1 \times \left(\frac{1}{2}\right)^5 = \frac{1}{32}$

The probabities can be also be obtained by expanding the binomial $\left(\frac{1}{2}+\frac{1}{2}\right)^5$. The binomial p.d for number of head obtained in 5 tosses of fair coin is

P.T.O

Page#2.

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

Q#2 (b)

Page#1

Two possiable outcome = win and not win.

The probability of A's winning $p = 2/3$

Successive games are independently won or lose and there are 8 games.

Therefore the Binomial probability distruation with $n = 8$ and $p = 2/3$.

then detonted by the numbers of games by 'A.' Then.

(i) $P(x=4) = \binom{8}{4}\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^4 = \frac{1120}{6561} = 0.1707$

$P(x \geq 4) = 1 - P(x<4)$ (∵ at least 4 mean or more)

$= 1 - \sum_{x=0}^{3}\binom{8}{x}\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{8-x}$

$= 1 - \left[\left(\frac{1}{3}\right)^8 + 8\left(\frac{2}{3}\right)\left(\frac{1}{3}\right)^7 + 28\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^6 + 56\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^5\right]$

$= 1 - \frac{1}{6561}\left[1 + 16 + 112 + 448\right]$

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

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

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

P.T.O.

page # 2.

$= \frac{64}{6561}[28+16+4] = \frac{64 \times 48}{6561} = \frac{1024}{2187} = 0.4682$

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

$= \binom{8}{3}\left(\frac{2}{3}\right)^{3}\left(\frac{1}{3}\right)^{5} + \binom{8}{4}\left(\frac{2}{3}\right)^{4}\left(\frac{1}{3}\right)^{4} + \binom{8}{5}\left(\frac{2}{3}\right)^{5}\left(\frac{1}{3}\right)^{3} + \binom{8}{6}\left(\frac{2}{3}\right)^{6}\left(\frac{1}{3}\right)^{2}.$

$= \frac{2^3}{(3)^3}[56+140+224+224]$

$= \frac{8 \times 644}{6561} = \frac{5152}{6561} = 0.7852.$

end.

Q # 3(a)

No. of children	Tally	f
0	1	1
1	1111	4
2	~~1111~~ 111	8
3	~~1111~~ ~~1111~~ 1	11
4	~~1111~~ 111	8
5	~~1111~~	5
6	1111	4
7	111	3
8	11	2
9	1	1
10	111	3
		50

Q # 3(b)

Group	f
0 — 1	5
2 — 3	19
4 — 5	13
6 — 7	7
8 — 9	3
10 — above	3
	50

end ⇒ Q.