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* paper :- BioStatistic.

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Q1

(a)

x	y
3	25
4	24
5	20
6	20
7	19
8	17
9	16
10	13
11	10
13	8

$$\bar{y} = \frac{172}{10} = 17.2$$

$$\bar{x} = \frac{76}{10} = 7.6$$

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

$$r = \frac{\Sigma(76-7.6)\ \Sigma(172-17.2)}{\Sigma(68.4)^2\ \Sigma(154.8)^2}$$

$$r = \frac{68.4 \times 154.8}{4678.56 \times 2396364}$$

$$r = \frac{10588.32}{112112320}$$

$$r = \frac{10588.32}{10588.32} = \boxed{1.00000}.$$

Q1

part (b)

X	Y	X^2	Y^2	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
$\Sigma=165$	$\Sigma=114$	$\Sigma=3309$	$\Sigma=1604$	$\Sigma=2099$

(a) Formula for Least Square Regression Line for Y on X.

$$Y = a + bx$$

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

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

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

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

$$b = 0.031$$

Q2

(a) A Fair coin is tossed 5 time find the probability of obtaining various number of head.

Than we observe that

(1) Each toss coin has two possible outcome head and tail.

(2) The probability of head (Success) is $p = 1/2$ and remain the same for successive tosses

(3) The successive Tosses of the coin are Independent

(4) The coin is Tosses 5 time

Therefore r.v X which denote the numbers of head has bionomial probability distribution with $p = 1/2$ and $n = 5$ the possible value of $x =$ are 1, 2, 3, 4 and 5

hence,

$p(\text{no head}) = p(x=0) = (5/0)(1/2)^0(1/2)^5 = 1 \times (1/2)^5 = 1/32$

$p(\text{1 head}) = p(x=1)\ (5/1)(1/2)^1(1/2)^{5-1} = 5 \times (1/2)^5 = 5/32.$

$p(\text{2 heads}) = p(x=2)(5/2)(1/2)^2(1/2)^{5-2} = 10 \times (1/2)^5 = 10/32$

$p(\text{3 heads}) = p(x=3)\ (5/3)(1/2)^3(1/2)^{5-3} = 10 \times (1/2)^5 = 10/32$

$p(\text{4 head}) = p(x=4)\ (5/4)(1/2)^4(1/2)^{5-4} = 5 \times 1/32 = 5/32$ and

$p(\text{5 heads}) = p(x=5)(5/5)(1/2)^5(1/2)^0 = 1 \times (1/2)^5 = 1/32$

These probability cane also be obtained by expanding the binomiad $(1/2)+(1/2)^5$ the binomial p.d for number of head obtained in 5 tosses of fair coin is

Q2

part (B)

(a) There are two possible outcome i-e A will not win the the game

(b) The probability of A's wining in each game is $p = 2/3$

(c) The successive game are indpendly won or lost and there are 8 game therefore The Binomial distribution with $n = 8$ and $p = 2/3$ alppropreate

i) $= P(x=4) \binom{8}{4}\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^4 \frac{1120}{5661} = 0.1707$

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

at least 4 mean 4 or more

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

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

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

(iii) $P(x \geq 6) \sum_{x=7}^{1} \binom{8}{x}\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{1-x}$

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

$= \frac{64}{6561}(28 + 16 + 4) \quad \frac{64 + 48}{6561} = \frac{1024}{2187} = 0.4682$

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

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

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

$$= \frac{2^3}{(3)^8}\left[56 + 140 + 224 + 224\right]$$

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

Q3

(a) Ungrouped distribution

x	tally	F	CF
0	0	0	0
1	/	3	3
2	·//	8	11
3	///	10	21
4	////	8	29
5	~~////~~	5	34
6	~~////~~ /	4	38
7	~~////~~ //	3	41
8	~~////~~ ///	2	43
9	~~////~~ ////	1	44
10	~~////~~ ~~////~~	2	46.

$\Sigma = 46$

(5) Grouped frequency distribution

					3	8	10	1
2	6	1	5	4	2	4	10	3
4	3	3	0	5	3	2	7	4
5	3	3	6	3	4	8	10	7
1	4	2	4	4	2	9	2	2
7	5	6	5	3				

$R = 10 - 0 = 10$

$W = 10/7 = 1.428$

$C = 2$

Class limit	CB	Tally	F	Cf
0-1	1.5	1	4	2- 6
0+2 = 2-3	1.5 - 3.5	11	12	14
2+2 = 4-5	3.5 - 5.6	11	13	15
4+2 = 6-7	5.6 - 7.5	1	6	8
6+2 = 8-9	7.5 - 9.5	1	2	4
8+2 = 10-11	9.5 - 10.5	11	3	5