Q1 (a) :- page (1)

Ans (a) :-

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

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

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

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

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

$$r = \frac{68.4 \times 154.8}{\sqrt{4678.56 \times 2396304}}$$

$$r = \frac{10588.32}{11211520}$$

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

$$= \boxed{1.000000}$$

Q. 9 (b)

(1) part
Ans (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

$$\hat{y} = a + bx \quad - (1)$$

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

$$b_{yx} \quad \frac{9 \times 2099 - 165 \times 114}{9 \times 3,309 - (165)^2}$$

$$b_{yx} \quad \frac{81}{2556} = 0.0316$$

$$a = \bar{y} - b\bar{x} \quad - (1)$$

$\bar{x} = \frac{\Sigma x}{n} = \frac{165}{9} = 18.33$

$\bar{y} \quad \frac{\Sigma y}{n} = \frac{114}{9} = 12.66$

$a = 12.66 - 0.0316 \times 18.33$

$a = 12.081$

$\hat{y} = a + bx$

$\hat{y} = 12.081 + 0.0316x$

$x = a + by$

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

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

$b_{xy} = \frac{81}{1440} \Rightarrow 0.05625$

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

$a = 12.66 - 0.05625 \times 18.33$

$a = 11.62$

$x = a + by$

$x = 11.62 + 0.05625y$

(1) (Page 5)

x	20	11	15	10	10	17	18	
y	5	15	14	14	17	8	9	
					21	25	28	
					12	16	18	

Σy	x	xy	y^2
5	20	100	400
15	11	165	~~400~~ 121
14	15	210	225
17	10	170	100
8	17	136	289
12	21	102	324
16	25	252	441
18	28	400	625
114	165	504	
		2099	3,309

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

$$b = \frac{9 \times 2,099 - 165 \times 114}{9 \times 3309 - (165)^2}$$

$$b = \frac{81}{2556} \Rightarrow 0.0316$$

(page 6)

$\bar{x} = \frac{\Sigma x}{n} = \frac{165}{9} = 18.33$

$\bar{y} = \frac{\Sigma y}{n} = \frac{114}{9} = 12.66$

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

$a = 12.66 - 0.0316 \times 18.33$

$a = 12.66 - 0.579$

$a = 12.081$

The estimated regression model.

$\hat{y} = a + bx$

$\hat{y} = 12.08 + 0.0316x$

prediction of y when x = 20+41+15+25+28 = 99

$\hat{y} = 12.081 + 0.0316\,(99)$

$\hat{y} = 12.081 + 3.128$

$\hat{y} = 15.209.$

Q.2 (a) A fair coin is tossed 5 times. (Page 7)
find the probability of obtaining 5 times
number of heads.

Ans 2 (a) :-

Let us regard the tossing of a coin as experiment. then we observe that.

(1) : Each toss of coin has two possible outcomes, head and tail.

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

(3) : The successive tosses of the coin independent.

(4) : The coin is tossed 5 times.

Therefore, the r.v. x which denote the number of head (Success) has a binomial probability distribution with $p = 1/2$ and n=5 the possible value of x are 0, 1, 2, 3, 4 and 5 hence.

: P(no head) = P(x=0) :

$$\left[\frac{5}{0}\right]\left[\frac{1}{2}\right]^0\left[\frac{1}{2}\right]^5 = 1\times\left[\frac{1}{2}\right]^5 = \frac{1}{32}$$

: P(1 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 heads) = 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 heads) = 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 heads) = P(x=4)

$$\left[\frac{5}{4}\right]\left[\frac{1}{2}\right]^4\left[\frac{1}{2}\right]^{5-4} = 10\times 5\times\left[\frac{1}{2}\right]^5 = \frac{5}{32}$$

=) P(5 heads) = P(x=5)

$$\left[\frac{5}{5}\right]\left[\frac{1}{2}\right]^5\left[\frac{1}{2}\right]^0 = 1\times\left[\frac{1}{2}\right]^5 = \frac{1}{32}$$

Probability can also be obtained by (Page 9)
expanding the binomial $(1/2 + 1/2)^5$.

The binomial P.d.f for number of head obtain in 5 tosses of fair coin is.

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 10

Ans (b)

⇒ Two possible out come i.e:
A will win or will not win.

⇒ Probability: A win $p = 2/3$

= 10 games.

= $n = p = 2/3$

⇒ Successive game won & last independently

(i) $P(x=4) = \frac{10}{4} \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^4 = \frac{1120}{5651} = 0.$

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

$= 1 - \sum_{x=0}^{3} \left(\frac{10}{x}\right)\left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{8-x}$

$= 1 - \left[\left(\frac{1}{3}\right) + 10\left[\frac{2}{3}\right]\left[\frac{1}{3}\right] + 28\left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^2 + 56\left[\frac{2}{3}\right]^3 \left(\frac{1}{3}\right)^5\right]$

$1 - \frac{1}{65.61}(1 + 16 + 28 + 448)$

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

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

$= \frac{28}{6} \left(\frac{2}{3}\right)^6 \left(\frac{1}{3}\right)^2 \left(\frac{10}{7}\right)\left(\frac{1}{3}\right)^7$

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

$\frac{100}{6561}(36 + 16 + 2) = \frac{100 \times 48}{6561}$

$\frac{4800}{2187} = 2.194$

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

$= \frac{10}{3} \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^5 + \left(\frac{2}{4}\right)^4 \left(\frac{1}{3}\right)^4 + \left(\frac{10}{5}\right)\left(\frac{2}{3}\right)^5 \left(\frac{1}{3}\right)^3 + \left(\frac{10}{6}\right)\left(\frac{2}{3}\right)\left(\frac{1}{3}\right)^2$

$= \left(\frac{(2)^2}{3^{10}}\right)(60 + 180 + 240 + 244)$

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

: 18 (page 12)

Q3 (a)

Ans (a) ungrouped distribution

u	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
		$\Sigma = 46$	

$u\left(\frac{1}{3}\right)^{8-1}$

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

^{2}

(Page 15)

Q.7 (b)

Ans (b)

Grouped frequency distribution.

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	9	2	2

$R = 10 - 0 = 10$

$10 : 10/7 = 1428$

$c = 2$

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