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Q1 part (A)

x	y	x^2	y^2	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
$\Sigma = 76$	$\Sigma = 172$	$\Sigma = 670$	$\Sigma = 3240$	$\Sigma = 1148$

Formulla for Correlation Coefficient

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

For $n = 10$

②

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

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

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

$$r = -\frac{1592}{161306}$$

$$r = 0098 \text{ Ans -}$$

Q1 –

part = B

x	y	x^2	y^2	xy
2	5	400	25	~~300~~ 100
11	15	121	225	165
15	14	225	196	210
10	~~8~~ 17	~~289~~ 100	~~64~~ 289	~~136~~ 170
17	~~10~~ 8	289	64	136
18	9	324	81	162
21	12	441	~~144~~ 144	252
25	16	625	~~256~~	400
28	18	784	~~784~~ 324	504
Σ = 165	Σ = 84	Σ = 3309	Σ 1604	Σ = 2099

Line for y on x

$$X = a + bx$$

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

$$b = \frac{(9)(2099) - (165)(114)}{29781 - 27225}$$

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

$$b = 0.031$$

Now $a = 1/n \{ \Sigma y - b\Sigma x \}$

$$a = 1/9 \{ 114 - (0.031)(165) \}$$

$$a = 1/9 \{ 114 - 5115 \}$$

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

$$a = 12.09$$

Hence $y = a + bx$

$$y = 1209 + 0.031x$$

Least square regression line.

(4) For x on Y

$x = a + by$

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

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

$$b = \frac{1389 - 18810}{14436 - 12996}$$

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

$b = 0.056$

Now

$a = 1/n \{\Sigma x - b\Sigma y)$

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

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

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

$a = 17.62$

Hence $x = a + by$

$x = 17.62 + 0.056y.$

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b

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

$y = 12.09 + 0.031x$

$= 12.09 + (0.031)(20) = 12.71$

$= 12.09 + (0.031)(11) = 12.4$

$= 12.09 + (0.031)(15) = 12.5$

$= 12.09 + (0.031)(25) = 12.8$

$= 12.09 + (0.031)(28) = 12.9$

$x = 17.62 \cdot 0.056y$

$= 17.62 - 0.056(5) = 17.9$

$= 17.62 + 0.056) = 18.46$

$= 17.62 + 0.054(9)\ 18.124$

$= 17.62 + 0.056(2) = 18.292$

$= 17.62 \cdot 0.056(16) = 18.516$

$= 17.62 + 0.056(18) = 18.628$

Q: (3) part(b)

Given Information of children born to 50 women.

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

Grouped frequency distribution for given data.

$N = 50 \quad x_0 = 1, \; x_m = 10$

$\text{Range} = x_m - x_0$

$R = 10 - 1 = \boxed{9}$

$k = 1 + 3.3 \log N$

$= 1 + 3.3 \log(50)$

$= 1 + 3.3(1.698)$

$= 1 + 5.6066$

$k = 6.606 = \boxed{6}$

$h = \text{Class Interval} = \frac{\text{Rang}}{k}$

$h = \frac{9}{7} = 1.285 = \boxed{2}$

we find out the Information from data :

$N = 50$, $R = 9$, $k = 6$, $h = 2$

Classes	Frequency	Classbondry	Midpoint
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	10.5 - 11.5	11

Total = -

R. frequency	R frequncy %	C.f	R.cf
5/50	5/50 × 100 = 10	5	5/50 = 0.1
19/50	19/50 × 100 = 38	24	24/50 = 0.5
13/50	13/50 × 100 = 26	37	37/50 = 0.6
7/5	7/50 × 100 = 14	44	44/50 = 0.8
3/50	3/50 × 100 = 6	47	47/50 = 0.9
3/50	3/50 × 100 = 6	50	50/50 = 1

Q: (3) part(b)

Given Information of children born to 50 women.

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

Grouped frequency distribution for given data.

$N = 50 \quad x_0 = 1, \; x_m = 10$

$Range = x_m - x_0$

$R = 10 - 1 = \boxed{9}$

$K = 1 + 3.3 \log N$

$= 1 + 3.3 \log(50)$

$= 1 + 3.3(1.698)$

$= 1 + 5.6066$

$K = 6.606 = \boxed{6}$

$h = \text{Class Interval} = \frac{\text{Rang}}{K}$

$h = \frac{9}{7} = 1.285 = \boxed{2}$

Q2. part (a) (9)

Example :-

A fair coin is tossed 5 times find the probabilities of obtaining various number of head lets us regard the tossing of a coin as an 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 remain the same for successive tosses
(3) The ~~coi~~ successive tosses of coin are Independent.
(4) The coinn is tossed 5 times

Therefore the r.v X which denotes the number of heads (successes) 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.

(10)

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

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

$p(2\text{ heads}) = p(x=2) = \binom{5}{2}\left(\frac{1}{2}\right)^2\left(\frac{1}{2}\right)^{5-2} = 10\times\left(\frac{1}{2}\right)^5 = \frac{10}{32}$

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

$p(4\text{ heds}) = p(x=4) = \binom{5}{4}\left(\frac{1}{2}\right)^4\left(\frac{1}{2}\right)^{5-4} = 5\times\left(\frac{1}{2}\right)^5 = \frac{5}{32}$ and

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

These probabilities can also be obtained by expanding the binomial $\left(\frac{1}{2}+\frac{1}{2}\right)^5$

probabilities distribution for the number of heads obtained in 5 tosses of a fair coin is

x	0	1	2	3	4	5
$f(x)$	$\frac{1}{32}$	$\frac{5}{32}$	$\frac{10}{32}$	$\frac{10}{32}$	$\frac{5}{32}$	$\frac{1}{32}$

Q2 part (b) (11)

Solution Here-

There fore the binomial probability dist with $n=10$

$p = 2/3$

$q = 1-p$

$q = 1-2/3$

$q = 1/3$

Let x denote the number of won by A then

(i) $p(x \geq 4) = 1 - p(x < 4)$

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

$= 1 - \left[\left(\frac{1}{3}\right)^{10} + 10\left(\frac{2}{3}\right)^1\left(\frac{1}{3}\right)^9 + 45\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^8\right.$

$\left. + 120\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^7\right]$

$= 1 - \frac{1}{59049}\left[1 + 20 + 180 + 960\right]$

$1 - 0.0197$

$\boxed{p(x \geq 4) = 0.9803}$

(ii) $P(x=4) = \binom{10}{4}\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^6$

$= 216\left(\frac{16}{81}\right)\left(\frac{1}{729}\right)$

$= \frac{3360}{59049}$

$\boxed{P(x=4) = 0.056}$

(iii) $P(x=11) = P(0) =$ because x can take only value

$0, 1, 2, 3 \text{ ---- } 10$

(iv) 6 or more games

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

$= \binom{10}{6}\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^4 + \binom{10}{7}\left(\frac{2}{3}\right)^1\left(\frac{1}{3}\right)^3 +$

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

$+ \binom{10}{10}\left(\frac{2}{3}\right)^{10}\left(\frac{1}{3}\right)^0$

$P = 0.228 + 0.261 + 0.196 + 0.087 + 0.018$

$\boxed{P(x \geq 6) = 0.79}$