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Date 22-06-2020

Q(2) **Ans : (a)**

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

(i) Each toss of a coin has two possible outcomes, heads (success) and tails (failure).

(ii) The probability of a head is $p = 1/2$ and remains the same for successive tosses.

(iii) The successive tosses of the coin are independent.

(iv) The coin is tossed 5 times.

Therefore the r.v. X which denotes the heads has a binomial probability distribution with $p = 12$ and $n = 5$.

The possible value of X are 0, 1, 2, 3, 4, 5.

$$P(0 \text{ head}) = P(X=0) = \binom{5}{0}\left[\frac{1}{2}\right]^0\left[\frac{1}{2}\right]^5$$

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

P.T.O

(2)

$P(1 \text{ head}) = P(X=1) = \begin{bmatrix}5\\1\end{bmatrix}\left[\frac{1}{2}\right]^{2}\left[\frac{1}{2}\right]^{5-1} = 5\times\left[\frac{1}{2}\right]^{5} = \frac{5}{32}$

$P(2 \text{ head}) = P(X=2) = \begin{bmatrix}5\\2\end{bmatrix}\left[\frac{1}{2}\right]^{2}\left[\frac{1}{2}\right]^{5-2} = 10\times\left[\frac{1}{2}\right] = \frac{10}{32}$

$P(3 \text{ head}) = P(X=3) = \begin{bmatrix}5\\3\end{bmatrix}\left[\frac{1}{2}\right]^{3}\left[\frac{1}{2}\right]^{5-3} = 10\times\left[\frac{1}{2}\right]^{5} = \frac{10}{32}$

$P(4 \text{ head}) = P(X=4) = \begin{bmatrix}5\\4\end{bmatrix}\left[\frac{1}{2}\right]^{4}\left[\frac{1}{2}\right]^{5-4} = 5\times\left[\frac{1}{2}\right]^{5} = \frac{1}{32}$

$P(5 \text{ head}) = P(X=5) = \begin{bmatrix}5\\5\end{bmatrix}\left[\frac{1}{2}\right]^{5}\left[\frac{1}{2}\right]^{0} = 1\times\left(\frac{1}{2}\right)^{5} = \frac{1}{32}$

These probabilities can also be obtained by expanding the binomial $(\frac{1}{2} + \frac{1}{2})^3$. The binomial p.d for the number of heads obtained in 5 tosses of fair coin is.

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

Q2(2)

Ans (b):

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

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

$= 1 - \left[\left(\frac{1}{3}\right)^{10} + 10\left(\frac{2}{3}\right)^1\left(\frac{1}{3}\right)^9 + 45\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^8 + 120\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^7 \right]$

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

$= 1 - 0.0197$

$P(X \geq 4) = \boxed{0.9803}$

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

$= 210\left(\frac{16}{81}\right)\left(\frac{1}{729}\right)$

$= \frac{3360}{59049}$

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

(iii) $P(X=11) = \{(0)$ = because because x can take only value $0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10$

(iv) 6 or more games

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

$$= \binom{10}{6}\left(\frac{2}{3}\right)^{6}\left(\frac{1}{3}\right)^{4} + \binom{10}{7}\left(\frac{2}{3}\right)^{1}\left(\frac{1}{3}\right)^{3} + \binom{10}{8}\left(\frac{2}{3}\right)^{8}\left(\frac{1}{3}\right)^{2} + \binom{10}{9}\left(\frac{2}{3}\right)^{9}\left(\frac{1}{3}\right)^{1} + \binom{10}{10}\left(\frac{2}{3}\right)^{10}\left(\frac{1}{3}\right)^{0}$$

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

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

Q (3) **Ans (a):**

Ciiven data

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

ungroup frequency distribution

No	Tally mark	frigueney	Comulative frigueney
0	|	1	1
1	||||	4	5
2	卌 |||	8	13
3	卌 卌 |	11	24
4	卌 |||	8	32
5	卌	5	37
6	||||	4	41
7	|||	3	44
8	||	2	46
9	|	1	47
10	|||	3	50

Q2(3) **Ans (b):**

Group frequency distribution of these data:

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

$N = 50$

$x_0 = 1 \quad , \quad x_m = 10$

$\text{Range} = x_m - x_0$

$K = 1 + 3.3 \log N$

$K = 1 + 3.3 \log (50)$

$= 1 + 3.3 \ (1.698)$

$= 1 + 5.6067$

$= 6.607$

$\boxed{K = 7}$

$h = \text{class interval} = \dfrac{\text{Rage}}{K}$

$h = 9/7 = 1.285 = 2$

$\boxed{h = 2}$

we find out the information from data .

N = 50

classes	Frequency	classboundary	mid point
0 - 1	5	-0.5 - 1.5	1
1 - 3	19	1.5 - 3.5	7.5
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	50		

R. frequency	R. frequency %	c.f	R.c.f
5/50	$\frac{5}{50} \times 100 = 10$	5	$\frac{5}{50} = 0.1$
19/50	$\frac{19}{50} \times 100 = 38$	24	$\frac{24}{50} = 0.5$
13/50	$\frac{13}{50} \times 100 = 26$	32	$\frac{38}{50} = 0.6$
7/50	$\frac{7}{50} \times 100 = 14$	44	$\frac{44}{50} = 0.8$
3/50	$\frac{3}{50} \times 100 = 6$	47	$\frac{47}{50} = 0.9$
3/50	$\frac{3}{50} \times 100 = 6$	50	$\frac{50}{50} = 1$

Q1 **Ans (a):**

Calculation correction between x and y

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	1361
9	16	81	256	144
10	13	100	169	130
11	10	121	100	110
13	8	169	64	104
$\Sigma x = 76$	$\Sigma y = 172$	$\Sigma x^2 = 670$	$\Sigma y^2 = 3240$	$\Sigma xy = 1148$

$n = 14$

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

$$r = \frac{14(1148) - (76)(172)}{\sqrt{14(670) - (76)^2[14(32040) - (172)^2}}$$

$$r = \frac{16072 - 13072}{\sqrt{(9380 - 5776)(45360 - 29584)}}$$

$$r = \frac{3000}{\sqrt{(3604)(15776)}}$$

$$r = \frac{3000}{7540}$$

$$\boxed{r = 0.39}$$

Q(1) Ans (b):

x	y	x^2	xy
20	5	400	100
11	15	121	165
15	14	225	210
10	17	100	170
17	8	289	136
18	9	324	162
21	12	441	252
25	16	625	400
28	18	784	504
$\Sigma x = 165$	$\Sigma y = 114$	$\Sigma x^2 = 8309$	$\Sigma xy = 2099$

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

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

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

$$b = \frac{18891 - 18810}{\sqrt{27881 - 27225}}$$

$$b = \frac{81}{556}$$

$$b = \frac{81}{23} = \boxed{3.52}$$

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

$$= \frac{114}{9} - 3.52\left(\frac{165}{9}\right)$$

$$a = 12.66 - (3.52)(18.33)$$

$$a = \boxed{-51.86}$$

$$\hat{y} = a + b\bar{x} \qquad \{x = 20,\}$$

$$\hat{y} = -51.86 + bx$$

$$\hat{y} = -51.86 + 3.52 \times 20$$

$$\hat{y} = \boxed{18.53}$$

The End.