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Subject

Biostatistics

Department

BS (Dental)

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Q.NO: 3 (a)

Given 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	4	4	4	4	6	8	10	7
7	5	5	5	3	2	3	9	2	2

Un-Grouped - frequency distribu

S.no	Tally mean	Frequency	Comulative freq
0	I	1	1
1	IIII	4	5
2	~~IIII~~ III	8	13
3	~~IIII~~ ~~IIII~~ I	11	24
4	~~IIII~~ III	8	32
5	~~IIII~~	5	37
6	IIII	4	41
7	III	3	44
8	II	2	46
9	I	1	47
10	III	3	50

Q NO: 3 PART B

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

unGrouped frequency distribution for given data

$N = 50 \qquad X_0 = 1, \qquad X_m = 10$

$R = X_m - X_0$

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

$K = 1 + 3.3 \log N$

$= 1 + 3.3 \log(50)$

$= 1 + 3.3(1.698)$

$= 1 + 5.6066$

$K = 6.606 = \boxed{6}$

h = class interval = $\frac{\text{Range}}{K}$

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

We findout the information from data.

Classes	Frequency	class boundry	Mid point
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 − 10	3	10.5 − 11.5	11
Total	50		

R. Frequency	R. Frequency %	C.F	R-C-F
5/50	5/50x100 = 10	5	5/50 = 0
19/50	19/50x100 = 38	24	24/50 = 0
13/50	13/50x100 = 26	32	32/50 = 0
7/50	7/50x100 = 14	44	44/50 = 0
3/50	3/50x100 = 6	47	47/50 = 0
3/50	3/50x100 = 6	50	50/50 = 0

QN:1 PART : B

S. no	X	Y	x_i^2	xy
1	20	5	400	100
2	11	15	121	165
3	15	14	225	210
4	10	17	100	170
5	17	8	289	136
6	18	9	324	162
7	21	12	441	252
8	25	16	625	400
9	28	18	784	504
	$\Sigma x = 165$	$\Sigma y = 114$	$\Sigma x^2 = 2699$	$\Sigma xy = 2099$

(a) For y on x

$$Y = mx + b \longrightarrow (A)$$

$$m = \frac{N\Sigma(xy) - \Sigma x \Sigma y}{N\Sigma(x^2) - (\Sigma x)^2}$$

$$= \frac{9 \times 2099 - 165 \times 114}{9 \times 2699 - 27225}$$

$$= \frac{18891 - 18810}{42291 - 27225}$$

$$m = \frac{81}{-2934}$$

$$m = -0.027$$

For b

$$b = \frac{\Sigma y - m \Sigma x}{N}$$

$$= \frac{114 - (0.027)(165)}{9}$$

$$b = 118.45$$

Now eq A becomes

$$y = mx + b$$

$$y = -0.027x + 118.45$$

(For x on y)

$$y = mx + b$$

$$x = \frac{y - b}{m}$$

$$\boxed{x = \frac{y - 118.45}{-0.027}}$$

b) Preditive values

y for x = 20, 11, 15, 25, 28

$x = 20$

$y = mx + b$

$y = -0.027(20) + (118.45)$

$y = 117.91$

$x = 11$

$$y = (-0.027)(11) + 118.45$$

$$= 118.15$$

$x = 15$

$$y = 118.04$$

$x = 25$

$$y = 117.77$$

$x = 28$

$$y = 117.69$$

Q NO: 1 PART A

Ans:

S.no	x	y	$(x_i - \bar{x})^2$	$(y_i - \bar{y})^2$	$(zx)i$	~~$(zx)i$~~	$(zy)i$	$(zx)i\,(zy)i$
1	3	25	21.16	60.84	-1.44		1.39	-2.00
2	4	24	12.96	46.24	-1.13		1.21	-1.36
3	5	20	6.76	7.84	-0.81	sorry	0.5	-0.40
4	6	20	2.56	7.84	-0.5		·05	-0.25
5	7	19	0.36	3.24	-0.19		032	-0.06
6	8	17	0.16	0.04	·0.13		-0.03	-0.003
7	9	16	1.96	1.44	0.44		-0.21	-0.009
8	10	13	5.76	17.64	0.75	sorry	-0.75	-0.56
9	11	10	11.56	51.84	1.06		-1.29	-1.36
10	13	8	28.16	84.64	1.67		-1.64	-2.73
	$\bar{x} = 7.6$	$\bar{y} = 17.2$	$S_{xi} = 3.21$	$S_{yi} = 5.6$		sorry		$\sum = -8.81$

$$S_x = \sqrt{\frac{(x_i - \bar{x})^2}{n-1}} = \sqrt{10.2} = 3.2$$

$$S_y = \sqrt{\frac{(y_i - \bar{y})^2}{n-1}} = \sqrt{31.29} = 5.6$$

$$(Zx)_i = \frac{(x_i - \bar{x})}{Sx}$$

$$(Zy)_i = \frac{(y_i - \bar{y})}{Sy}$$

$$r = \frac{\sum (Zx)_i (Zy)_i}{n-1} = \frac{-881}{9}$$

$$\boxed{r = -0.978}$$ Ans.

Q NO: 2: (PART-A):

(A) – A fair coin is tossed 5 times, Find the probability of obtaining variouse number of heads.

Ans: Let us regard the tossing of of coins as an experiment. Then we observe that.

① Each toss of coin has two possible outcomes, haid and tail.

(2) The probability of a head succes is $p = \frac{1}{2}$

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

4) The coin is tossed 5 times.

Therefore the r y x which donates the numbers of heads (successes) has a binomial probability distribution with $p = \frac{1}{2}$ and $n = 5$ the possible value of x are 0. 1, 2, 3. 4 and 5 hence.

$$P(\text{no head} = P(x=0) = \begin{bmatrix}5\\0\end{bmatrix}\left[\frac{1}{2}\right]^{n}\left[\frac{1}{2}\right]^{5} - 1 \times \left[\frac{1}{2}\right]^{5} = \frac{1}{32}$$

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

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

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

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

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

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

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

Q No: 2 PART B.:

Ans.: We observe that

(a) There are two possible outcomes i.e A will win or well not win the game.

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

(C) The successive games are independently won or lost. and

(d) There are 8 games.

Therefore the binomial probability distribution with $n = 8$ and $p = 2/3$ is appropriat.

Let x denote the number of games won by A. then

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

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

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

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

$$= 1 - \frac{577}{6561}[1+16+112+448]$$

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

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

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

$$= \frac{64}{6561}[28+16+4] = \frac{64+48}{6561} = \frac{1024}{2187} = 0.4882$$

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

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

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

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

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