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MLT - ~~B.Sc~~ Semister 6th

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paper - Biostatistics

Q NO 1 part A page 1

=> Lets :- $u = x - n/2 \Rightarrow u = x - 7$

:- $v = y - n/2 \Rightarrow v = y - 19$

| x | y | u | v | $u^2$ | $v^2$ | uv |
|---|---|---|---|---|---|---|
| 3 | 25 | -4 | 6 | 16 | 36 | -24 |
| 4 | 24 | -3 | 5 | 9 | 25 | -15 |
| 5 | 20 | -2 | 1 | 4 | 1 | -2 |
| 6 | 20 | -1 | 1 | 1 | 1 | -1 |
| 7 | 19 | 0 | 0 | 0 | 0 | 0 |
| 8 | 17 | 1 | -2 | 1 | 4 | -2 |
| 9 | 16 | 2 | -3 | 4 | 9 | -6 |
| 10 | 13 | 3 | -6 | 9 | 36 | -18 |
| 11 | 10 | 4 | -9 | 16 | 81 | -36 |
| 13 | 8 | 6 | -11 | 36 | 121 | -66 |
| 76 | 172 | 6 | -18 | 96 | 314 | -170 |

∴ Formula :- For finding $\gamma$

Now :-

$$\gamma = \frac{\Sigma uv - (\Sigma u)(\Sigma v)/n}{\sqrt{\left[\Sigma u^2 - \frac{(\Sigma u)^2}{n}\right]\left[\Sigma v^2 - \frac{(\Sigma v)^2}{n}\right]}}$$

P

putting the value of table in formula.

$$\gamma = \frac{-170 - \frac{6 \times -18}{10}}{\sqrt{\left[96 - \frac{96}{10}\right]\left[314 - \frac{314}{10}\right]}}$$

$$\gamma = \frac{-1700 + 108}{\sqrt{\left[\frac{960 - 96}{10}\right]\left[\frac{3140 - 314}{10}\right]}}$$

$$\gamma = \frac{-1.592}{\sqrt{\left[\frac{864}{10}\right]\left[\frac{2826}{10}\right]}}$$

$$\gamma = \frac{-1592}{\sqrt{\left[\frac{2441664}{100}\right]}}$$

$$\gamma = \frac{-\frac{1592}{10}}{1562.58} = \frac{-1592 \times 10}{1562.58 \times 10}$$

$$\gamma = \frac{-15,920}{15625.8} = 1.01 \quad \text{Ans}$$

# Q.NO 1 part B part a A

| X | Y | XY | $X^2$ | $Y^2$ |
|---|---|---|---|---|
| 20 | 5 | 100 | 400 | 25 |
| 11 | 15 | 165 | 121 | 325 |
| 15 | 14 | 210 | 225 | 196 |
| 10 | 17 | 170 | 100 | 289 |
| 17 | 8 | 306 | 288 | 64 |
| 18 | 9 | 162 | 324 | 81 |
| 21 | 12 | 252 | 441 | 144 |
| 25 | 16 | 400 | 625 | 258 |
| 28 | 18 | 504 | 784 | 324 |
| 165 | 114 | 2269 | 3309 | 1604 |

The Regression equation of y on x is

$$y = a + bx$$

$$\Rightarrow b = \frac{n\Sigma xy - \Sigma x \Sigma y}{9(2269) - (165)(114)}$$
$$9(3309) - (165)^2$$

$$\Rightarrow b = \frac{20421 - 18810}{29781 - 27225} = \frac{1611}{2556}$$

$\Rightarrow \boxed{b = 0.63} \rightarrow A$

$$a = \frac{\Sigma y}{n} - b\left(\frac{\Sigma x}{n}\right)$$

$$a = \frac{114}{9} - 0.63\left(\frac{165}{9}\right)$$

$$a = 18.66\ 0.63(18.33)$$

$$a = 12.66 - 11.55$$

$$a = 1.11$$

∴ Thus Regression Eq x on y

$$x = a + b \cdot y$$

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

$$b = \frac{9(2269) - (165)(114)}{9(1604) - (114)^2}$$

$$b = \frac{20421 - 18810}{14436 - 12396}$$

$$b = \frac{1611}{1440} \qquad \boxed{b = 1.12} \rightarrow B$$

Thus Calculate Regression of $x$ on $y$

$$\hat{x} = a + by$$

$$\hat{x} = 4.15 + 1.12y$$

$$\boxed{\hat{x} = 5.27}$$ pants

Part B

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

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

$$a = 12.66 - 0.0316 \times 18.33$$

$$a = 12.66 - 0.579$$

$$a = 12.081$$

The Estimation regression

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

$$\hat{y} = 12.8 + 0.0316$$

prediction of $y$ when $x = 20 + 11 + 15 + 35 + 28 + 18$

of $x$ $12.81 + 0.0316(aa)$

$$y = 12.081 + 3.128$$

$$\hat{y} = 15.209$$

# NO 2 B part (B)

Predicated values of y for $x = 20, 11, 15, 25, 28$

$\hat{y} = a + bx$

$= 1.11 + 0.63(20)$ $\quad x = 20$

$\hat{y} = 1.11 + 12.6$

$\boxed{\hat{y} = 13.71} \rightarrow (I)$

$\hat{y} = 1.11 + 0.63(21)$

$\boxed{\hat{y} = 10.56} \rightarrow (II)$

$\hat{y} = 1.11 + 6.63(15$

$\boxed{\hat{y} = 10.56} \rightarrow (III)$

$\hat{y} = 1.11 + 0.63(25)$

$\boxed{\hat{y} = 16.86} \rightarrow (IV)$

$\hat{y} = 1.11 + 6.63(28)$

$\boxed{\hat{y} = 18.75} \rightarrow (V)$

predicted value of x for y

$y = 5, 15, 9, 12, 16, 18$

$\bar{x} = 4.15 + 1.12(5)$

$\bar{x} = 9.75$ → (i) $y = 5$

$\bar{x} = 4.15 + 1.12(15)$ $y = 15$

$\bar{x} = 20.95$ → (ii)

$\bar{x} = 4.15 + 1.12)(9)$ $y = 15$

$\bar{x} = 17.59$ → (iii)

$y = 9$

$\bar{x} = 4.15 + 1.12(12)$

$\bar{x} = 17.59$ → (iv)

$y = 12$

$\bar{x} = 4.15 + 1.12(16)$ $y = 16$

$\bar{x} = 22.09$ → (v)

$\bar{x} = 4.15 + 1.12(18$ $y = 18$

$\bar{x} = 24.31$

$\bar{x} = 4.15 + 1.19$ (

## Q NO 2 part A

$n = 5$

Let $x$ denote number of heads

$x = 0, 1, 2, 3, 4, 5$

$P(x = x) = C^n_x \; p^x \; q^{n-x}$

$\boxed{p = 2/3}$, $q = 1 - p$

$q = 1 - 2/3$

$q = 1/1 - 2/3$

$q = \frac{3-2}{3} = 1/3$

$q = 1/3$

$P(x=0) = {}^5C_0 \times (\frac{2}{3})^0 (1/3)^{5-0}$

$\boxed{P(x=0) = 1/32}$ Ans.

P

$$P(x=1) = {}^{5}C_1 \left(\tfrac{2}{3}\right)^1 \left(\tfrac{1}{3}\right)^{5-1}$$

$$= {}^{5}C_1 \left(\tfrac{2}{3}\right)\left(\tfrac{1}{3}\right)^4$$

$$\boxed{P(X=1) = 5/32}$$

$$P(x=2) = \frac{5}{2} \left(\tfrac{2}{3}\right)^2 \left(\tfrac{1}{3}\right)^{5-2}$$

$$= \left(\frac{5}{2}\right)\left(\frac{2}{3}\right)^2\left(\tfrac{1}{3}\right)^2$$

$$P(x=2 \quad \boxed{= 10/32}$$

$$P(x=3) = \left(\tfrac{5}{3}\right)\left(\tfrac{2}{3}\right)^3 \left(\tfrac{1}{3}\right)^{5-3}$$

$$= \left(\frac{5}{3}\right)\left(\frac{2}{3}\right)^3 \left(\tfrac{1}{3}\right)^2$$

$$\boxed{P(x=3) = \frac{10}{3}}$$

$$P(x=4) = \left(\frac{5}{4}\right)\left(\frac{2}{3}\right)^4 \left(\tfrac{1}{3}\right)^{5-4}$$

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

$$\boxed{P(x=4) = \frac{5}{32}}$$

(12)

$$P(X=5) = \binom{5}{5}\left(\frac{2}{3}\right)^5\left(\frac{1}{3}\right)^{5-5}$$

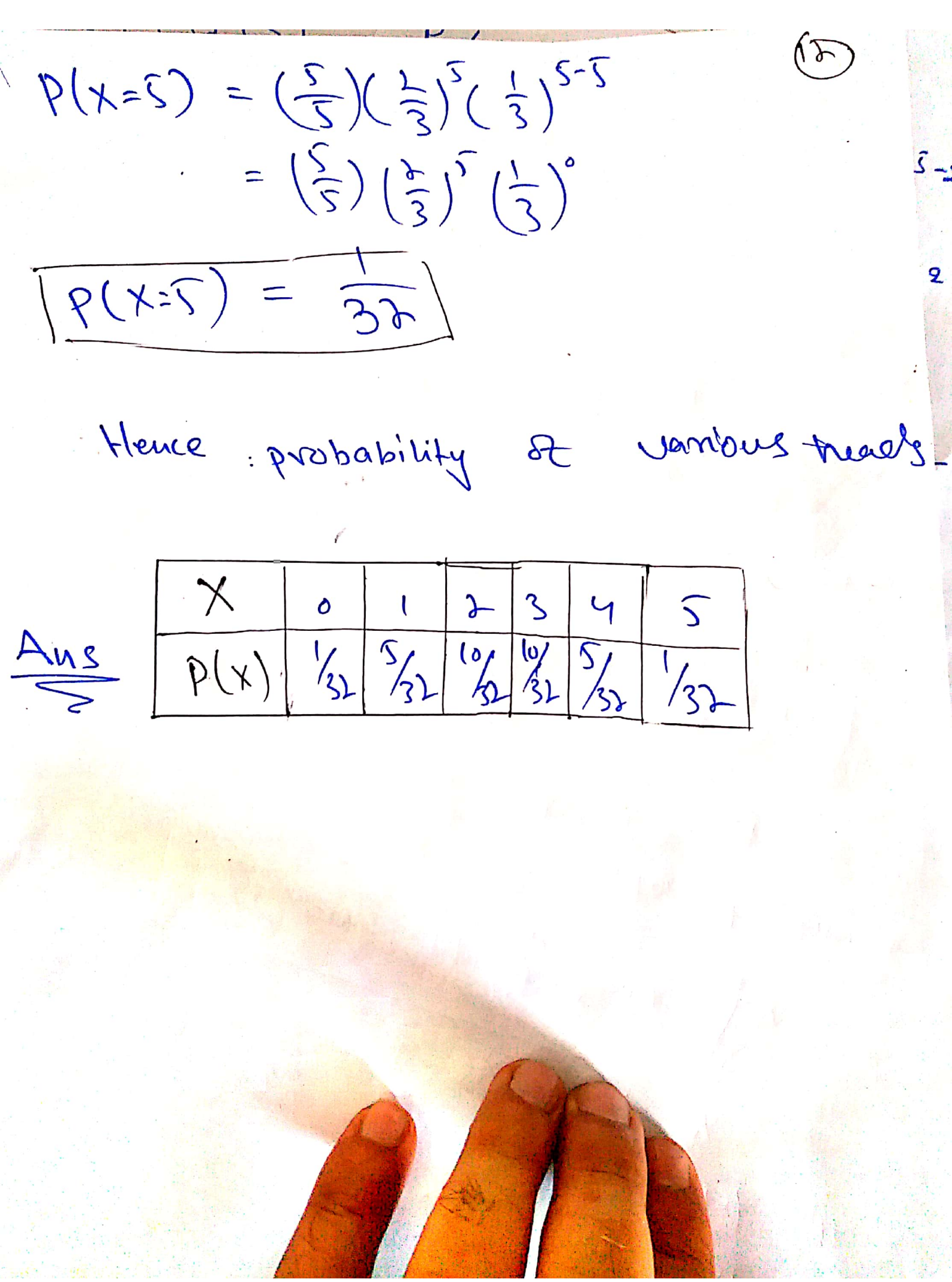
$$= \binom{5}{5}\left(\frac{2}{3}\right)^5\left(\frac{1}{3}\right)^0$$

$$\boxed{P(X=5) = \frac{1}{32}}$$

Hence : probability of various treats -

Ans

| X | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| P(X) | 1/32 | 5/32 | 10/32 | 10/32 | 5/32 | 1/32 |



Q NO 3 part A

Given Data

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 6 | 1 | 5 | 4 | 3 | 3 | 2 | 10 | 1 |
| 4 | 3 | 3 | 0 | 5 | 2 | 1 | 11 | 10 | 3 |
| 5 | 3 | 3 | 0 | 3 | 3 | 2 | 2 | 7 | 4 |
| 1 | 4 | 1 | 4 | 4 | 4 | 6 | 8 | 10 | 7 |
| 7 | 5 | 0 | 5 | 1 | 2 | 3 | 9 | 2 | 2 |

Uncomplete - Frequency distribution

| NO | Tally mark | Frequency | Cumulative frequency |
|---|---|---|---|
| 0 | I | 1 | 1 |
| 1 | IIII | 4 | 5 |
| 2 | IIII III | 8 | 13 |
| 3 | III 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

(14)

Given Information of Children B/w to So woman.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 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 |

group frequency distribution for given data

$N$ = 50 data

$N$ = 50 $\quad x_0 = 1 \cdot \quad x_m = 10$

Range = $x_m = x_0$

$R = 10 - 1$ [9]

$K = 1 + 3.3 \log N$

$= 1 + 33 \cdot \log(50)$

$1 + 3.3\ (1.698)$

$= 1 + 5.6066$

$K = 6.606 =$ [6]

$h = \frac{9}{7} = 1.285 = \boxed{2}$ (15)

We find out information from data.

$N = 50 \quad R = 9, \; K = 6 \quad h = 2$

| Classes | Frequency | Class bendary | Main point |
|---|---|---|---|
| 0-1 | 5 | 0.5 - 1.5 | 1 |
| 2-3 | 19 | 1.5 - 3.5 | 2.5 |
| 4-5 | 13 | 35 - 5.5 | 4.5 |
| 0-7 | 7 | 55 - 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.e.f |
|---|---|---|---|
| 5/50 | 5/50 x 100 = 10 | 5 | 5/50 = 0 |
| 19/50 | 19/50 x 100 = 38 | 24 | 24/50 = 0 |
| 13/50 | 13/50 x 100 = 20 | 37 | 37/50 = 0 |
| 7/50 | 7/50 x 100 = 14 | 44 | 44/50 = 0 |
| 3/50 | 3/50 x 100 = 6 | 47 | 47/50 = 0 |
| 3/50 | 3/50 x 100 | 50 | 50/50 = 0 |