CBCS Course
School of Studies in Statistics
Vikram University, Ujjain
M.A./M.Sc. II sem Statistics

Practical Based on all Theory Papers.

Title :— A Simple random sample of 20 house hold was drawn from a city area containing 14848 house hold the no of person per households in the sample was as follows

5	6	3	3	2	3	3	3	4	4	3	2	7	4	
3	5	4	4	3	3	4	3	3	3	2	4	3		

Estimate the total no of population in the area and Compute the probability that this estimation is with in ±10% of the true value

* Formula used: (i) $\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n}$

ii) $\hat{Y} = N\bar{y}$

iii) 10% of $\hat{Y} = t \cdot \frac{NS}{\sqrt{n}} \sqrt{1-f}$

where

$$S^2 = \frac{1}{n-1} \sum_{i=1}^{n} (y_i - \bar{y})^2$$

$$S.f = \frac{n}{N}$$

Calculation - Here it is given that $n = 3$

$N = 14848$

Calculation Table:

y_i	$(y_i - \bar{y})$	$(y_i - \bar{y})^2$
5	1.5	2.25
6	2.5	6.25
3	-0.4	0.16
3	-0.4	0.16
2	-1.46	1.96
3	-0.4	0.16
3	-0.4	0.16
3	-0.4	0.16
4	0.5	0.25
4	0.5	0.25
3	-0.4	0.16
2	-1.4	1.96
7	3.5	12.25
4	0.5	0.25
3	-0.4	0.16
5	1.5	2.25
4	0.5	0.25
4	0.5	0.25
3	-0.4	0.16
3	-0.4	0.16
4	0.5	0.25
3	-0.4	0.16
3	-0.4	0.16
1	-2.4	5.76
2	-1.5	2.25

4	0.5	0.25
3	-0.4	0.16
2	-1.4	1.96
4	0.5	0.25
104		40.77

$$\bar{y} = \frac{\Sigma y_i}{n} = \frac{104}{30} = 3.46$$

$$\hat{Y} = N.\bar{y}$$
$$= 14848 \times 3.46$$
$$= 51374.08$$

$$f = \frac{n}{N} = \frac{30}{14848} = 0.0020$$

$$s^2 = \frac{1}{n-1} \sum_{i=1}^{n} (y_i - \bar{y})^2$$

$$= \frac{1}{30-1} (40.77) \Rightarrow \frac{1}{29} \times 40.77$$

$$s^2 = 1.405 \Rightarrow s = 1.18$$

$$10\% \text{ of } \hat{Y} = t \cdot \frac{N s}{\sqrt{n}} \cdot \sqrt{1-f}$$

$$\frac{10}{100} \times 51374.078 = t \times \frac{14848 \times 1.18 \times \sqrt{1-0.002}}{\sqrt{30}}$$

$$5137.408 = \frac{t \times 17520.64 \times 0.998}{5.47}$$

$$5134.408 \times 5.47 = t \times 17485.59$$

$$t = 1.60$$

Result –

For the value of $t = 1.60$ the required probability from the normal table is 0.05, therefore we reject our hypothesis & we can say that the estimated value do not lie within the plus & minus 10% of the true value. Also the total number of t population in the area is 5137.408.

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