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Sec :- "A"

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Q3:- Types of Statistics

There are two types of Statistics

(1) Descriptive Statistics

Descriptive Statistics can be define as " The Collection of data, analysis of data, Summarization of data, Interpretation of data, tabulation of data at last we get a Precise result in numerical form is called descriptive Statistics

(2) Inferential Statistics

Inferential Statistics is a branch of Statistics through which we collect the data, analysis the data, Summarize data, Interpretate the data and tabulate the data to get Precise result in non-numerical form.

Source of Primary Data

- Direct Personal Investigation
- Indirect Investigation
- Interview method
- Collection through Enumerators
- Questioner method
- Collection through local Sources
- Computer Interview method

Nominal Scale

It can be define as "the classification of the observation into mutually exclusive qualitative classes. It is said to be nominal scale.

E.g

i:- Student are classified as male and female, we may use number 1 and 2.

ii:- Rainfall may be classified as heavy, moderate and light. We may use number 1, 2 and 3.

Random Statistics

In Statistics a random Variable is an assignment of a numerical value to each possible outcome of an event space. This association facilitates the identification and the calculation of the probability of the events.

Q1 (i) Solution :-
(Grouped Frequency Distribution)

largest Value = 10
Smallest Value = 0

Range = $10 - 0 = 10$

We decide to take 5 classes of equal size

$h = \frac{10}{5} = 2$ Say 2.1

$h = 2.1$

| Class width | Class Boundries | Mid-Point | Tally | Frequency | C. Frequency |
|-------------|-----------------|-----------|-------|-----------|--------------|
| 0 - 2 | -0.05 - 2.05 | 1 | | 13 | 13 |
| 2.1 - 4.1 | 2.05 - 4.15 | 3.1 | | 21 | 34 |
| 4.2 - 6.2 | 4.15 - 6.25 | 5.2 | | 9 | 43 |
| 6.3 - 8.3 | 6.25 - 8.35 | 8.3 | | 5 | 48 |
| 8.4 - 10.4 | 8.35 - 10.45 | 9.4 | | 2 | 50 |
| | | | | 50 | |

Ungrouped Frequency Distribution

| Number of children | Tally | Frequency | C.f |
|--------------------|--------------|-----------|-----|
| 0 | — | 1 | 1 |
| 1 | | 4 | 5 |
| 2 | | 8 | 13 |
| 3 | | 14 | 27 |
| 4 | | 7 | 34 |
| 5 | | 5 | 39 |
| 6 | | 5 | 43 |
| 7 | | 3 | 46 |
| 8 | | 2 | 48 |
| 9 | — | 1 | 49 |
| 10 | — | 1 | 50 |
| Total | | 50 | |

Mode = Grouped frequency Distribution:

$$M = l + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times R \rightarrow \textcircled{1}$$

$$l = 2.05$$

$$f_m = 21$$

$$f_1 = 13$$

$$f_2 = 9$$

$$n = 21$$

$$M = 2.05 + \frac{(21 - 13)}{(21 - 13) + (21 - 9)} \times 2.1$$

$$M = 2.89 \approx 3$$

$$\text{Mode} = 3$$

Median:

First we check $\frac{n}{2}$

$$\frac{n}{2} = \frac{50}{2} = 25$$

So;

$$l = 2.05$$

$$h = 2.1$$

$$f = 21$$

$$c = 13$$

$$\text{Median} = l + \frac{h}{f} \left(\frac{n}{2} - c \right)$$

$$= 2.05 + \frac{2.1}{21} \left(\frac{50}{2} - 13 \right)$$

$$= 3.25 \approx 3$$

$$\text{Median} = 3$$

Ungrouped freq Distribution.

Mode :-

In ungrouped data the highest frequency is 14. So the number of children in front of 11 is 3.

Thus Mode 3

Median :-

Our data is even as

$$\begin{aligned} \text{Median} &= \frac{n}{2} \\ &= \frac{50}{2} \\ &= 25 \end{aligned}$$

Q2:-

| Classes | C. Boundries | Frequency (f) | Cumulative freq. |
|---------|--------------|---------------|------------------|
| 2-4 | 1-5 | 3 | 3 |
| 6-8 | 5-9 | 13 | 16 |
| 10-12 | 9-13 | 6 | 22 |
| 14-16 | 13-17 | 10 | 32 |
| 18-20 | 17-21 | 5 | 37 |
| 22-24 | 21-25 | 3 | 40 |
| 26-28 | 25-29 | 5 | 45 |
| 30-32 | 29-33 | 3 | 48 |
| 34-36 | 33-37 | 2 | 50 |

$$\Sigma = 50$$

Quartile :-

$$Q = \frac{n}{4} = \frac{50}{4} = 12.5$$

12.5 lies in 5-9 class B.

$$Q_1 = l + \frac{R}{f} \left(\frac{n}{4} - c \right)$$

$$= 5 + \frac{4}{13} \left(\frac{50}{4} - 3 \right)$$

$$= 5 + 0.30 (12.5 - 3)$$

$$= 5 + 0.30 (9.5)$$

$$Q_1 = 7.85$$

$$Q_2 = \frac{2n}{4} \Rightarrow \frac{2 \times 50}{4} = 25$$

25 lies in 13-17 class B.

$$Q_2 = l + \frac{R}{f} \left(\frac{2n}{4} - c \right)$$

$$= 13 + \frac{4}{10} \left(\frac{2 \times 50}{4} - 22 \right)$$

$$= 13 + \frac{4}{10} (25 - 22)$$

$$= 13 + \frac{4}{10} (3) = 13 + 1.2$$

$$Q_2 = 14.2$$

$$Q_3 = \frac{3n}{4} = \frac{3 \times 50}{4} \Rightarrow 37.5$$

37.5 lies in 21-25 Class B.

$$Q_3 = l + \frac{h}{f} \left(\frac{3n}{4} - c \right)$$

$$= 21 + \frac{4}{3} \left(\frac{3 \times 50}{4} - 37 \right)$$

$$= 21 + \frac{4}{3} (37.5 - 37)$$

$$= 21 + \frac{4}{3} (0.5)$$

$$= 21 + 0.67$$

$$Q_3 = 21.67$$

1) Deciles

$$D_1 = \frac{n}{10} \Rightarrow \frac{50}{10} = 5$$

5 lies in 5-9 class B.

$$D_1 = l + \frac{h}{f} \left(\frac{n}{10} - c \right)$$

$$= 5 + \frac{4}{13} \left(\frac{50}{10} - 3 \right)$$

$$= 5 + \frac{4}{13} (5 - 3) = 5 + \frac{4}{13} (2)$$

$$= 5 + 0.61$$

$$D_1 = 5.61$$

$$D_2 = \frac{2n}{10} = \frac{2 \times 50}{10} \Rightarrow 10$$

10 lies in 5-9

$$D_2 = l + \frac{R}{f} \left(\frac{2n}{10} - c \right)$$

$$D_2 = 5 + \frac{4}{13} \left(\frac{2 \times 50}{10} - 3 \right)$$

$$D_2 = 5 + \frac{4}{13} (10 - 3)$$

$$= 5 + \frac{4}{13} (7)$$

$$= 5 + 2.15$$

$$D_2 = 7.15$$

$$D_3 = \frac{3n}{10} = \frac{3 \times 50}{10} = 15$$

15 lies in 5-9 class B.

$$\text{Hence } D_3 = l + \frac{R}{f} \left(\frac{3n}{10} - c \right)$$

$$D_3 = 5 + \frac{4}{13} \left(\frac{3 \times 50}{10} - 3 \right)$$

$$D_3 = 5 + \frac{4}{13} (15 - 3)$$

$$D_3 = 5 + 0.307 (12)$$

$$D_3 = 5 + 3.69$$

$$D_3 = 8.69$$

$$D_4 = \frac{4n}{10} \Rightarrow \frac{4 \times 50}{10} \Rightarrow 20$$

20 lies in 9-13 Class B

$$\text{Hence } D_4 = l + \frac{h}{f} \left(\frac{4n}{10} - c \right)$$

$$D_4 = 9 + \frac{4}{6} (20 - 16)$$

$$D_4 = 9 + \frac{4}{6} (4)$$

$$D_4 = 9 + 2.67$$

$$D_4 = 11.67$$

$$D_5 = \frac{5n}{10} = \frac{5 \times 50}{10} \Rightarrow 25$$

25 lies in 13-17 Class B

$$\text{Hence } D_5 = l + \frac{h}{f} \left(\frac{5n}{10} - c \right)$$

$$D_5 = 13 + \frac{4}{10} \left(\frac{5 \times 50}{10} - 22 \right)$$

$$= 13 + \frac{4}{10} (25 - 22)$$

$$= 13 + \frac{4}{10} (3)$$

$$D_5 = 14.2$$

$$D_6 = \frac{6n}{10} = \frac{6 \times 50}{10} = 30$$

30 lies in 13-17 Class B.

$$\begin{aligned} D_6 &= l + \frac{R}{f} \left(\frac{6n}{10} - c \right) \\ &= 13 + \frac{4}{10} \left(\frac{6 \times 30}{10} - 22 \right) \\ &= 13 + \frac{4}{10} (30 - 22) \\ &= 13 + \frac{4}{10} (8) \\ &= 13 + 3.2 \end{aligned}$$

$$D_6 = 16.32$$

$$D_7 = \frac{7n}{10} = \frac{7 \times 50}{10} = 35$$

35 lies in 17-21 Class B.

$$\begin{aligned} D_7 &= l + \frac{R}{f} \left(\frac{7n}{10} - c \right) \\ D_7 &= 17 + \frac{4}{5} \left(\frac{7 \times 50}{10} - 32 \right) \\ &= 17 + \frac{4}{5} (3) \\ &= 17 + 2.4 \end{aligned}$$

$$D_7 = 19.4$$

$$D_8 = \frac{8n}{10} = \frac{8 \times 50}{10} \Rightarrow 40$$

40 lies in 21-25 Class B.

$$D_8 = l + \frac{h}{f} \left(\frac{8n}{10} - c \right)$$

$$= 21 + \frac{4}{3} \left(\frac{8 \times 50}{10} - 37 \right)$$

$$= 21 + \frac{4}{3} (40 - 37)$$

$$= 21 + \frac{4}{3} (3)$$

$$= 21 + 4$$

$$\boxed{D_8 = 25}$$

$$D_9 = \frac{9n}{10} \Rightarrow \frac{9 \times 50}{10} = 45$$

45 lies in 25-29 Class B.

$$D_9 = 25 + \frac{4}{5} \left(\frac{9 \times 50}{10} - 40 \right)$$

$$D_9 = 25 + \frac{4}{5} (5)$$

$$D_9 = 25 + 4$$

$$\boxed{D_9 = 29}$$