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Subject ***Probability & statistics***
Assignment ***Mid term***
Semester ***8th***
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Question No 1: ^①

Solution: (Grouped frequency Distribution)

$$\text{Largest value} = 10$$

$$\text{Smallest value} = 0$$

$$\text{Range} = 10 - 0 = 10$$

We decide to take 5 classes of equal

$$h = \frac{10}{5} = 2 \quad \text{say } 2.1$$

$$h = 2.1$$

Class (width)	Class boundaries	Mid Point	Tally	Frequency
0-2	-0.05 - 2.05	1		13
2.1 - 4.1	2.05 - 4.05	3.1		21
4.2 - 6.2	4.15 - 6.25	5.2		9
6.3 - 8.3	6.25 - 8.35	8.3		5
8.4 - 10.4	8.35 - 10.45	9.4		2
Total				50

(2)

C. frequency . . .

13

34

43

48

50.

On group frequency ⁽³⁾ distribution.

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

(4)

Grouped frequency distribution.

Mode :

$$M = L + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times h$$

$$L = 2.05$$

$$f_m = 21$$

$$f_1 = 13$$

$$f_2 = 9$$

$$h = 2.1$$

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

$$M = 2.89 \approx 3$$

$$\text{Mode} = 3.$$

(5)

Median.

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

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

So

$$l = 2.05$$

$$h = 2.1$$

$$f = 21$$

$$c = 13$$

Median:

$$\begin{aligned} & l + \frac{h}{f} \left(\frac{n}{2} - c \right) \\ &= 2.05 + \frac{2.1}{21} \left(\frac{50}{2} - 13 \right) \\ &= 3.25 \approx 3. \end{aligned}$$

Median = 3.

(6)

Ungrouped frequency distribution.

Mode:

In Ungrouped data the highest frequency is 14 so the number of childrens in front of 14 is 3

Thus

$$\text{Mode} = 3$$

Median:

Our data is even as it is 50

So

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

Q02:-
Calculate Quartile and decile

Class	x	f	Cf
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
		$\Sigma = 50$	

Q03

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Quantiles:-

$$Q_1 = \frac{n}{4} \Rightarrow \frac{50}{4} = 12.5$$

12.5 lies in 5-9 class boundary

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

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

$$= 5 + .30 (12.5 - 3)$$

$$= 5 + .30 (9.5)$$

$$= 7.85$$

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

25 lies in 13-17 class boundary

So

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

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

3

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

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

$$= 13 + 1.2$$

$$\boxed{Q_2 = 14.2}$$

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

37.5 lies in 21-25 class boundary

So

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

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

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

$$= 21 + \frac{4}{3} (0.5) = 21 + 0.67$$

$$\boxed{Q_3 = 21.67}$$

Deciles

$$D_1 = \frac{n}{10} \Rightarrow \frac{50}{10} = 4$$

4 lies in 5-9 class boundary

Hence

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

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

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

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

$$= 5 + 0.61$$

$$D_1 = 5.61$$

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

10 lies in 5-9

Hence

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

5

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

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

$$D_2 = 5 + \frac{4}{13} (7)$$

$$D_2 = 5 + 2.15$$

$$D_2 = 7.15$$

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

15 lies in 5-9 class boundary

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

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

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

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

$$D_3 = 5 + 3.69$$

$$D_3 = 8.69$$

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

20 lies in 9-13 class boundary

$$\text{Hence } D_4 = \frac{l+h}{2} \left(\frac{4n}{10} - c \right)$$

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

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

$$D_4 = 9 + 2.67$$

$$D_4 = 11.67$$

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

25 lies in 13-17 class boundary

7

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

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

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

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

$$D_5 = 14.2$$

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

30 lies in 13-17 class boundary

Hence

$$D_6 = \frac{l+h}{f} \left(\frac{6n}{10} - c \right)$$

$$= 13 + \frac{4}{10} \left(\frac{6 \times 50}{10} - 22 \right)$$

$$= 13 + \frac{4}{10} (30 - 22)$$

$$= 13 + \frac{4}{10} (8)$$

$$= 13 + 3.2$$

$$D_6 = 16.2$$

8

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

35 lies in 17-21 class boundary

Hence

$$D_7 = l + \frac{h}{f} \left(\frac{7n}{10} - c \right)$$

$$D_7 = 17 + \frac{4}{5} \left(\frac{7 \times 50}{10} - 32 \right)$$

$$D_7 = 17 + \frac{4}{5} (35 - 32)$$

$$= 17 + \frac{4}{5} (3)$$

$$= 17 + 2.4$$

$$D_7 = 19.4$$

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

40 lies in 21-25 class boundary

Hence

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

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

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

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

$$= 21 + 4$$

$$\boxed{D_8 = 25}$$

$$\uparrow D_9 = \frac{9n}{10} \Rightarrow \frac{9 \times 50}{10} \Rightarrow \frac{450}{10} = 45$$

45 lies in 25-29 class boundary
Hence

$$D_9 = l + \frac{h}{f} \left(\frac{9n}{10} - l \right)$$

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

$$D_9 = 25 + \frac{4}{5} (45 - 40)$$

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

10

$$D_9 = 25 + 4$$

$$D_9 = 29$$

Ans

= 45

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Question No : 3

Define the following.

(a)

Random Statistics

The fields of mathematics, probability, and statistics use formal definitions of randomness. 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 probabilities of the events.

(b)

Inferential Statistics:

- Inferential Statistics is a branch of statistics through which we collect the data, analysis the data, summarize the data, interpretate the data and tabulate the data to get precise result in non-numerical form.

OR

- The process of reaching generalizations about the whole by examining a portion is called inferential statistics.

OR

- By using inferential statistics we draw inference about the characteristics of related problem and our inference gives non-numerical results.

(c)

Descriptive statistics

can be defined 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

OR

- Descriptive statistics is concerned with the summarization and describing a body of data

OR

- Descriptive statistics is that branch of statistics which deals with concepts and methods concerned with summarization and description of important aspect of numerical data.

(d)

Sources of Primary Data:

- i. Direct personal investigation.
- ii. Indirect investigation
- iii. Interview method
- iv. Collection through Enumerators.
- v. Questioner method
- vi. Collection through local sources
- vii. Computer interview method

(e)

Nominal Scale:

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

E.g:

- i. Students 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

The numbers when they are used, only identify the categories. In this scale no particular order is used.