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Subject : Probability & Statistics

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Q no 1

①

i) Grouped frequency distribution

By scanning the data, we find that the largest number of baby born is "10" and the smallest number is "0" So that the arrange is

$$\text{Range} = \text{Largest value} - \text{Smallest value}$$

$$10 - 0$$

$$10$$

Suppose we take "6" classes of equal size

So, width of equal class interval

$$\text{Would be } 10/6 = 1.66 \Rightarrow \textcircled{2}$$

Frequency Distribution of number of children born

class	class Boundry	totally	Frequency
0-1	-0.5-1.5		5
2-3	1.5-3.5		22
4-5	3.5-5.5		12
6-7	5.5-7.5		7
8-9	7.5-9.5		3
10-11	9.5-11.5		1
			50

1) Ungrouped frequency Distribution

by scanning the data, we find that the number of children born is a discrete variable and the range is small so that the data can be conveniently sorted by taking the value of classes as 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 the frequency distribution is then constructed as:

no of children born	Tally	Frequency (f)
0		1
1		4
2	 	13
3	 	14
4	 	7
5		5
6		4
7		3
8		2
9		1
10		1
		50

Median for group data

Median for group data

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

l = lower class boundary

h = class interval

f = frequency

putting the values

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

low class boundary 1.5

upper " " 3.5

$$\text{class boundary } h = 3.5 - 1.5 = 2$$

$$f = 22$$

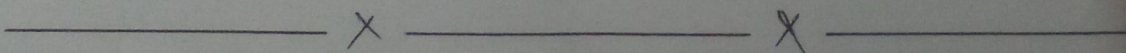
$$c = 5$$

put the value

$$1.5 + \frac{2}{22} (25 - 5)$$

$$= 1.5 + \frac{2}{22} (20)$$

$$= 1.5 + \frac{20}{11}$$



Median of Ungrouped data

Arrange data in Ascending order

0 1 1 1 1 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3
3 3 3 3 3 3 4 4 4 4 4 4 5 5 5 5 5
6 6 6 6 7 7 7 8 8 9 10

$$\text{Median } \frac{n}{2}$$

$$\frac{50}{2}$$

25th value

Mode of Ungrouped data

Maximum number of the ungrouped data is called mode

Mode = 3 → which is used 14 times

Mode of grouped data

$$\text{Formula } L + \frac{f_m - f_0}{2f_m - f_1 - f_0} \times h$$

$$= 1.5 + \frac{22 - 5}{2(22) - 12 - 5}$$

$$1.5 + \frac{17}{27} \times 2$$

$$\text{Mode} = 2.76$$

Question 2

(5)

Classes	class boundaries	frequency (f)	Cumulative frequency (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
		<hr/>	
		$\Sigma = 50$	

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

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

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

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

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

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

$$13 + 1.2$$

$$Q_2 = 14.2$$

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

37.5 lies in 21-25 class boundary

So

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

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

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

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

$$= 21 + 0.67$$

$$Q_3 = 21.67$$

Deciles

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

5 lies in 5-9 class boundary

Hence

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

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

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

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

$$5 + 0.61$$

$$D_1 = \boxed{5.61}$$

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

10 lies in 5-9

Hence

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

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

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

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

$$D_2 = 5 + 2.15$$

$$D_2 = \boxed{7.15}$$

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

15 lies in 5-9 class boundary

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

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

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

$$D_3 = 5 + 3.69$$

$$D_3 = 5 + 3.69$$

$$D_3 = \boxed{8.69}$$

(9)

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

20 lies in 9-13 class boundary

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

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

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

$$D_4 = 9 + 2.67$$

$$D_4 = \boxed{11.67}$$

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

25 lies in 13-17 class boundary

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

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

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

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

$$= \boxed{14.2}$$

(10)

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

30 lies in 13-17 class boundary

Hence

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

$$13 + \frac{4}{10} \left(\frac{6 \times 30}{10} - 22 \right)$$

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

$$13 + 3.2$$

$$= \boxed{16.2}$$

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

35 lies in 17-21 class

Hence

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

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

$$= 17 + \frac{4}{5} (0)$$

$$= 17 + 0$$

$$= \boxed{17}$$

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

40 lies in 21-25 class
boundary

Hence

$$\begin{aligned} D_8 &= l + \frac{h}{f} \left(\frac{8n}{10} - c \right) \\ &= 21 + \frac{4}{3} \left(\frac{8 \times 50}{10} - 37 \right) \\ &= 21 + \frac{4}{3} (40 - 37) \\ &= 21 + \frac{4}{3} (3) \\ &= 21 + 4 \\ D_8 &= \boxed{25} \end{aligned}$$

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

45 lies in 25-29 class
boundary

Hence

$$\begin{aligned} D_9 &= l + \frac{h}{f} \left(\frac{9n}{10} - c \right) \\ D_9 &= 25 + \frac{4}{5} \left(\frac{9 \times 50}{10} - 40 \right) \\ D_9 &= 25 + \frac{4}{5} (45 - 40) \\ D_9 &= 25 + \frac{4}{5} (5) \\ D_9 &= 25 + 4 \\ D_9 &= \boxed{29} \end{aligned}$$

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Question no 3

(12)

a) Random Statistics:

In statistics a random variable is an assignment of numerical value to each possible outcome of an event space. This association facilitates the identification E_i the calculation of probabilities of the event.

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

c) Descriptive Statistics :-

- Descriptive statistics can be defined as The collection of data analysis of data, summarization of data, interpretation of data tabulation of data etc. last we get a precise in numerical form is called descriptive statistics.

OR

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

d) Source 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.

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e) Nominal Scale :-

It can be defined 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 number when they are used, only identify the categories. In this scale no particular order is used.

