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Sec : A

Subject :- Probability and Statistics

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Qno 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 range 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
would be $10/6 = 1.66 \Rightarrow 2$

Frequency Distribution of number of children born

class	class boundary	Tally	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

i) 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 values of classes as 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 the frequency distribution is then constructed as ..

Number of Children born	Tally	Frequency (F)
0		1
1		4
2	 	8
3	 	14
4	 	7
5	 	5
6		4
7		3
8		2
9		1
10		1
		50

Part (ii)

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

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

$$\text{low class boundary} = 1.5$$

$$\text{upper " " " " } = 3.5$$

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

$$F = 22$$

$$c = 5$$

Put the values

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

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

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

$$= 1.5 + 1.82$$

$$\text{Median} = \boxed{3.32} \text{ (grouped data.)}$$

Median of ungrouped data..

~~4/10~~ Arrange Data in Ascending order

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

Q 10.

$$\begin{aligned}\text{Median} &= \frac{n}{2} \\ &= \frac{50}{2} \\ &= 25^{\text{th}} \text{ value} = (3)\end{aligned}$$

Mode of ungrouped data.

Maximum Frequency number of the ungrouped data is called mode

Mode = 3 → which is used 14 times

Mode of grouped Data

$$\text{Formula: } l_1 + \frac{f_m - f_0}{2f_m - f_1 - f_0} \cdot h$$

$$= \frac{1.5 + 22 - 5}{2(22) - 1 - 12 - 5} \cdot 2$$

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

$$\text{Mode} = 2.76$$

Q2,

Class	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
		$\Sigma = 50$	

Quantiles-

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

12.5 lies in 5-9 class boundary

So

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

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

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

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

$$= 7.85$$

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

25 lies in 13-17 class boundary

So

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

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

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

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

$$Q_2 = 14.2$$

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

37.5 lies in 21-25 class boundary

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

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

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

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

$$= 21 + 0.67$$

$$Q_3 = 21.67$$

Decision-

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

5 lies in 5-9 class boundary

Hence

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

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

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

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

$$= 5 + 0.61$$

$$D_1 = 5.61$$

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

10 lies in 8-9

Hence

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

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

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

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

$$D_2 = 5 + 2.15$$

$$D_2 = 7.15$$

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

15 lies in 5-9 class boundary

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

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

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

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

$$D_3 = 8.69$$

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

20 lies in 9-13 class boundary.

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

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

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

$$D_4 = 9 + 2.67$$

$$D_4 = 11.67$$

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

25 lies in 13-17

$$D_5 = l + \frac{h}{F} \left(\frac{S_n}{10} - c \right)$$

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

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

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

$$= 14.2.$$

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

30 lies in 13-17

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

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

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

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

$$= 13 + 3.2$$

$$= 16.2.$$

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

35 lies in 17-21

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

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

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

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

$$= 17 + 2.4$$

$$= 19.4$$

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

40 lies in 21-25 class boundary

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

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

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

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

$$D_8 = 25$$

$$D_q = \frac{q_n}{10} \Rightarrow \frac{q+50}{10} \Rightarrow \frac{450}{10} = 45$$

45 lies in 25-29 class boundary

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

$$D_q = 25 + \frac{4}{5} \left(\frac{q+50}{10} - 40 \right)$$

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

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

$$D_q = 25 + 4$$

$$D_q = 29$$

Qno (3)
A) Random Statistic

In the common parlance, randomness is the apparent lack of pattern or predictability in events.

A random sequences of events, symbols or steps often has no order and does not follow an intelligible pattern or combination.

b) Inferential statistics:-

Inferential statistics is a branch of statistics through which we collected the data analysis the data, summarize the data interpretate the data and tabulate the data to get precise result is non-numerical from OR

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

c) Descriptive Statistics:-

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

D) Source of Primary Data-

- 1) Direct personal investigation
- 2) Indirect investigation
- 3) Interview method
- 4) Collection through Enumerators
- 5) Questionnaire method
- 6) Collection through local sources
- 7) Computer interview method

E) Nominal Scales

It can be defined as The classification of the observation into mutually exclusive

qualitative classes said to be nominal scale
E.g. i) Rain Fall, may be ~~be~~ classified as heavy moderate and light. we may use number 1, 2 and 3.

ii) students are classified as male and Female we may use number 1 and 2.