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SEC : A

SUB : Probability and Statistics

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# Q # 1 (a)

## 2) Grouped frequency distribution

By scanning the data we find that the largest ~~value~~ number of baby born is 10 and the smallest number is 0 so that the range

$$\begin{aligned} \text{Range} &= \text{largest value} - \text{smallest} \\ &= 10 - 0 \\ &= 10 \end{aligned}$$

Suppose we take 6 classes of equal size so

Width of equal class interval would be  $10/6 = 1.66 \rightarrow 2$

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

$$\Sigma = 50$$



## ii) 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, ..., 10 the frequency distribution is then constructed as

No. 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

$$\Sigma = 50$$

(b)

Median for group data

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

$l$  = lower class boundary

$h$  = class interval

$f$  = frequency

putting the values

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

$$\text{lower c.b} = 1.5$$

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

$$h = 3.5 - 1.5 = 2$$

$$f = 22$$

$$c = 5$$

$$\text{Put the values} = 1.5 + \frac{2}{22} (25 - 5)$$

$$= 1.5 + 1.82$$

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



→ Median for 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 4 4 5 5 5 5 5  
6 6 6 6 7 7 7 8 8 9 10

$$\text{Median} = \frac{n}{2} = \frac{50}{2} = 25^{\text{th}} \text{ value} = 3$$

Mode of ungrouped data :-

Maximum frequency of number of ungrouped data is called mode

Mode = 3 → which is used 14 times

Mode of grouped data

$$\left[ \frac{f_m - f_0}{2f_m - f_1 - f_0} \times 2 \right]$$

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

$$= 2.76$$

## Q# 02

Class	Class boundary	Frequency (f)	Cummulative 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
		50	

$$\Sigma = 50$$

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

12.5 lies in 5-9 class boundary.

$$\begin{aligned}
 Q_1 &= l + \frac{h}{f} (n/4 - C) \\
 &= 5 + \frac{4}{13} \left( \frac{50}{4} - 3 \right) \\
 &= 7.85
 \end{aligned}$$

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

25 lies in 13-17 C.B



$$\text{So } Q_2 = 1 + h \left( \frac{2n - c}{4} \right)$$

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

$$Q_2 = 14.2$$

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

37.5 lies in 21-25 C.L

So

$$Q_3 = 1 + h \left( \frac{3n - c}{4} \right)$$

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

$$Q_3 = 21.67$$

→ Deciles

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

4 lies in 5-9 C.L

Hence

$$D_1 = 1 + h \left( \frac{n - c}{10} \right)$$

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

$$D_1 = 5 + 0.61$$

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

10 lies in 5-9 Hence

$$D_2 = 1 + \frac{h}{7} \left( \frac{2n}{10} - c \right)$$

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

$$= 5 + 2.15$$

$$D_2 = 7.15$$

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

15 lies in 5-9 Hence

$$D_3 = 1 + \frac{h}{7} \left( \frac{3n}{10} - c \right)$$

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

$$= 5 + 0.307 (12)$$

$$D_3 = 8.69$$



$$D_4 = \frac{4h}{10} \rightarrow \frac{4 \times 50}{10} \rightarrow 20$$

20 lies in 9-13 C.B

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

$$D_4 = 9 + 2.67$$

$$D_4 = 11.67$$

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

25 lies in 13-17 C.B

$$\text{Hence } D_5 = 13 + \frac{4}{7} \left( \frac{5h}{10} - c \right)$$

$$D_5 = 13 + \frac{4}{7} (25 - 22)$$

$$= 14.2$$

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

30 lies in 17-21 C.B

$$\text{Hence } D_6 = 17 + \frac{4}{7} \left( \frac{6h}{10} - c \right)$$

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

$$= 13 + 3.2$$

$$= 16.2$$

$$D7 = \frac{7n}{10} \rightarrow \frac{7 \times 50}{10} = 35$$

35 lies in 17 - 21 C.B

$$D7 = 1 + \frac{h}{7} \left( \frac{7n}{10} - c \right)$$

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

$$= 17 + 2.4$$

$$= 19.4$$

$$D8 = \frac{8n}{10} \rightarrow \frac{8 \times 50}{10} = 40$$

40 lies in 21 - 25 C.B

Hence

$$D8 = 1 + \frac{h}{7} \left( \frac{8n}{10} - c \right)$$

$$= 21 + \frac{4}{7} \left( \frac{8 \times 50}{10} - 37 \right)$$

$$= 21 + 4$$

$$D8 = 25$$



$$D_9 = \frac{9b}{10} \rightarrow \frac{9 \times 50}{10} = \frac{450}{10} = 45$$

45 lies in 25 - 29 class boundary

Hence

$$D_9 = 1 + \frac{b}{7} \left( \frac{9b}{10} - c \right)$$

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

$$D_9 = 25 + \frac{4}{5} (450 - 40)$$

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

$$D_9 = 25 + 4$$

$$= 29 \quad \text{- Ans.}$$

Q # 03

a) Random Statistics :-

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

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

b) Inferential statistics :-

It is the branch of statistics through which we collect the data, analyse the data, summarize the data, interpret and tabulate the data to get precise result in non-numerical form.

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



### c) Descriptive statistics :-

It can be defined as the collection of data, interpretation of data, analysis of data, summarization of data and tabulation of data and at last we get a precise result in numerical form is called descriptive statistic.

OR

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

### d) Source of primary data :-

- i) direct personal investigation
- ii) In-direct 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 designed as the classification of the observation into mutually exclusive qualitative classes is said to be nominal scale.

For example

1) Students are classified as male and female, we may use number 1 and 2.

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