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Section C

Subject Probability and Statistics

Q No 1

(i) Group frequency distribution

By scanning the data we find that the largest numbers of baby born is "10" and the smallest number is "0" so that the range is;

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

Suppose we take "6" classes of equal size so,

$$\text{Width of equal class interval would be} = \frac{10}{6} = 1.66 \Rightarrow \textcircled{2}$$

# 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) un grouped 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 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
		50

(ii) Median for group data -

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

$l$  = lower class boundary

$n$  = Class interval

$f$  = frequency

Putting the values

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

low class boundary = 1.5

upper class boundary = 3.5

Class boundary =  $h = 3.5 - 1.5 = 2$

$$f = 22$$

$$c = 5$$

put the values

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

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

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

$$= 1.5 + 1.82$$

Median = 3.32 (grouped data)

### Median of ungrouped data

Average Data in Ascending order

0 1 1 1 2 2 2 2 2 2 2 2 3 3 3 3 3 3  
3 3 3 3 3 3 4 4 4 4 4 4 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 number of the ungrouped data is called mode

Mode = 3  $\rightarrow$  which is used 14 times.

## Mode of grouped data :-

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

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

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

$$\text{Mode} = 2.76$$

Q.02 :-

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
		$\Sigma = 50$	



## Quartiles:-

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

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

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

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

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

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

$$= 13 + 1.2$$

$$\boxed{Q_2 = 14.2}$$

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

37.5 lies in 21-25 class boundary

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

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

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

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

$$\boxed{Q_3 = 21.67}$$

# 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

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

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

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

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

$$D_2 = 5 + 2.15$$

$$D_2 = 7.15$$

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

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

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

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

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

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

$$D_5 = 14.2$$

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

30 lies in 13-17 class boundary

Hence

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

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

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

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

$$= 13 + 3.2$$

$$D_6 = 16.2$$

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

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

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

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

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

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

$$= 21 + 4$$

$$\boxed{D_8 = 25}$$

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

45 lies in 25-29 class boundary  
Hence

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

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

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

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



$$D_9 = 25 + 4$$

$$D_9 = 29$$

Ans

Q03:- Define The following.

(1) Random Statistics:- In statistics, a random variable is an assignment of a numerical value to each possible outcome of a event space. This association facilitates the identification and the calculation of Probabilities of the events.

(2) 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.

(3) Descriptive Statistics:- Descriptive Statistics is the collection of data, analysis of data, summerization of data, interpretation of data, tabulation of data at last we get a precise result in

in numerical form is called descriptive Statistics.

~~Source~~

#### (4) 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

#### (5) 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.:-

- (1) Students are classified as male and female. We may use number 1 and 2.