

SYED JAWWAD

7386

PROBABILITY AND STATISTICS

Qno: 1

i) Grouped frequency distribution: Q #1

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

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

Suppose we take '6' classes of equal size so, width of equal class interval would be

$$10/6 = 1.66 \Rightarrow 2$$

Frequency distribution of number of children born:

| Class   | class boundaries | 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            |

- Median for group data:

(3)

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

$l$  = lower class boundary

$h$  = class interval

$f$  = frequency

Putting the values;

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

low class boundary = 1.5

upper class boundary = 3.5

class boundary =  $3.5 - 1.5 = 2$

$$f = 22$$

$$c = 5$$

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 grouped data:

- Arrange data in Ascending order:

(4)

0 1 1 1 1 2 2 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 9 10

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

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

$$\Rightarrow 25^{\text{th}} \text{ value} = 3$$

Mode of ungrouped data:

Maximum number of the ungrouped data is called mode.

Mode = 3 (it is repeated 14 times).

Mode of grouped data:

$$\text{Formula} \Rightarrow l + \frac{f_m - f_o}{2f_m - f_i - f_o} \times h$$

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

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

Mode  $\Rightarrow$  2.76.

Q # 2

5

| Classes | Class Boundaries | frequency (f) | Commulative frequency (C.F) |
|---------|------------------|---------------|-----------------------------|
| 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:-

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

$$= \frac{50}{4}$$

$$= 12.5$$

12.5 lies in 5-9

class boundary

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

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

$$= 5 + 0.30 (12.5 - 3)$$

$$= 5 + 0.30 (9.5)$$

$$Q_1 = 7.85$$

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

25 lies in 13-17 (class boundary)

So

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

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

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

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

$$= 13 + 1.2$$

$$Q_2 = 14.2$$

$$Q_3 = \frac{3n}{4}$$

$$= \frac{3 \times 50}{4}$$

$$= 37.5$$

37.5 lies in 21-25 class boundary

So

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

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

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

$$= 21 + 0.67$$

$$Q_3 = 21.67$$



DECILES:-

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

5 lies in 5-9 (class boundary)

Hence

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

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

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

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

$$= 5 + 0.61$$

$$D_1 = 5.61$$

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

10 lies in 5-9

Hence

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

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

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

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

$$D_2 = S + 2.15$$

$$D_2 = 7.15$$

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

15 lies in 5-9 (less boundary)

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

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

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

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

$$D_3 = S + 3.69$$

$$\boxed{D_3 = 8.69}$$

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

20 lies in 9-13 (class boundary)

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

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

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

$$D_4 = 9 + 2.67$$

$$\boxed{D_4 = 11.67}$$

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

25 lies in 13-17 (class boundary)

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

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

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

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

$$D_5 = 14.2$$

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

30 lies in 13-17 (class boundary)

Hence

$$D_6 = 13 + \frac{4}{10} (6n - 22)$$

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

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

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

$$= 13 + 3.2$$

$$D_6 = 16.2$$

(11)

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

35 lies in 17-21 (class)

Hence

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

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

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

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

$$= 17 + 2.4$$

$$D_7 = 19.4$$

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

40 lies in 21-25 (class boundary)

Hence

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

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

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

$$= 21 + 4$$

$$\boxed{D_8 = 25}$$

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

45 lies in 25-29 (class boundary)

Hence

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

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

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

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

$$D_9 = 25 + 4$$

$$\boxed{D_9 = 29}$$

Q #3

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## RANDOM STATISTICS:-

In Probability and Statistics it's known as a random variable in which 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. Random variables can be appear in random sequences. A random Process is a sequence of random variables whose outcomes do not follow a deterministic pattern, but follow an evolution described by ~~Proof~~ probability distributions. These and other constructs are extremely useful in Probability theory and the various applications of randomness.

## INFERENCEAL STATISTICS:-

- Inferential Statistics is a branch of Statistics through which we collect the data, analysis the data, summarize 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.



## DESCRIPTIVE STATISTICS :-

It can be defined as

1:- The collection of Data, analysis of Data, interpretation of data, tabulation of Data at last we get a precise result in numerical form is called descriptive statistics

OR

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

OR

3:- Descriptive Statistics is that branch of statistics which ~~deals~~ deals with concepts and methods concerned with summarization and description of important aspect of numerical Data.

## PRIMARY DATA:-

The data collected for the first time and original in character is called Primary data

OR

The Data that have been originally collected and have not under-gone any sort of Statistical treatment are called Primary Data.

OR

The Data is original & Raw form is called Primary Data:

### SOURCES OF PRIMARY DATA:-

1. Direct Personal Investigation.
2. Indirect Investigation
3. Interview Method
4. Collection through Enumerators.
5. Questioner Method.
6. Collection through Local sources.
7. Computer Interview Method.

# NOMINAL SCALE:-

It can be define as "the Classification of the Observation into mutually ~~exclusive~~ 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 ~~be~~ Classified as heavy,  
Moderates, light.  
we may use number 1, 2 & 3

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