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Section

A

Subject

Probability and
Statistics

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Q No 1

The following figure gives The number of Children born to 50 women.

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

- i) Construct a grouped & ungrouped frequency distribution of Data?
- ii) Find mode and median from grouped & ungrouped frequency distribution.

Solution:

Grouped frequency distribution.

Largest value = 10

Smallest value = 0

Range = $10 - 0 = 10$

We decide to take 5 classes of equal size

$h = \frac{10}{5}$ say 2.1

$h = 2.1$

Class Weight	Class Boundary	Mid point	Tally	Frequency	C.f
0 - 2	-0.05 - 2.05	1		13	13
2.1 - 4.1	2.05 - 4.15	3.1		21	34
4.2 - 6.2	4.15 - 6.25	5.2		9	43
6.3 - 8.3	6.25 - 8.35	7.3		5	48
8.4 - 10.4	8.35 - 10.45	9.4		2	50
Total				50	

Ungrouped Frequency distribution:

Number of children	Tally	Frequency	C.F
0		1	1
1		4	5
2		8	13
3		14	27
4		7	34
5		5	39
6		4	43
7		3	46
8		2	48
9		1	49
10		1	50
Total		50	

Grouped frequency distribution

mode:

$$M = l + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times h \quad \text{--- (1)}$$

$$l = 2.05$$

$$f_m = 21$$

$$f_1 = 13$$

$$f_2 = 9$$

$$h = 2.1$$

$$n = 2.89 \approx 3$$

$$\text{Mode} = 3$$

b) **Median**

First we take $\frac{n}{2}$

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

$$\text{So } l = 2.05$$

$$h = 2.1$$

$$f = 21$$

$$c = 13$$

$$\text{Median} = 1 + \frac{h}{f} \left(\frac{n}{2} - c \right)$$

$$2.05 + \frac{2.1}{21} \left(\frac{50}{2} - 13 \right)$$

$$3.25 \approx 3$$

$$\text{Median} = 3$$

Ungrouped frequency distribution
mode :

In underground data the highest frequency is 14 so the number of children front of 14 is 3

Thus mode = 3

$$\begin{aligned} \text{Median} &= \frac{n}{2} = \frac{50}{2} \\ &= 25 \end{aligned}$$

Q No 2

The following is the distribution of wages per thousand employees in a certain factory

Classes	2-4	6-8	10-12	14-16	18-20	22-24	26-28
F	3	13	6	10	5	3	5

30-32	34-36
3	2

Calculate all quartiles and deciles.

Classes	Class boundaries	Frequency	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

$$N = 50$$

Quartiles

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

So 12.5 lies in 5-9 class boundary

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

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

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

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

$$= 7.85$$

$$Q_2 = \frac{2n}{4} = 7 \quad \frac{2 \times 50}{4} = 25$$

25 lies in 13-17 class boundary

So

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

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

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

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

$$= 13 + 1.2$$

$$Q_2 = 14.2$$

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

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

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

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

$$Q_3 = 21.67$$

Deciles

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

4 lies in 5-9 class boundary

Hence

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

$$= 5 + \frac{4}{13} \left(\frac{50}{10} - 30 \right)$$

$$= 5 + 0.61$$

$$D_1 = 5.61$$

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

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

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

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

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

$$D_3 = 5 + 3.69$$

$$D_3 = 8.69$$

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

20 lies in 9-13 class boundary

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

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

$$D_4 = 11.67$$

$$D_5 = \frac{54}{10} \Rightarrow \frac{5 \times 50}{10} = 25$$

25 lies in 13-17 class boundary

Hence

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

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

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

$$D_5 = 14.2$$

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

30 lies in 13-17 class boundary

hence

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

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

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

$$13 + 3.2 = 16.2$$

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

35 lies in 17-21 class

Hence

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

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

$$17 + 2.9$$

$$= 19.9$$

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

40 lies in 21 - 25 (class boundary)

Hence

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

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

$$= 21 + 4$$

$$D8 = 25$$

$$D9 = \frac{9n}{10} = \frac{9 \times 50}{10} = \frac{450}{10} = 45$$

45 lies in 25 - 29 class boundary

Hence

$$D9 = l + \frac{h}{f} \left(\frac{9n}{10} - c \right)$$

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

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

$$D9 = 29$$

Q 3

Define the following

a) Random Statistics

In statistics a random variable is an assignment of numerical value to each possible outcome of an event space. These associations facilitate the identification and the calculation of probabilities of each event.

b) Inferential Statistics

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

OR

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

c) Descriptive Statistics

The collection of data, analysis of data, summarization of data, interpretation of data, tabulation of data, at last we get precise result in numerical form is called descriptive statistics.

OR
Descriptive statistics is concerned with

the summarization and describing
a body of data.

d) source of primary data

primary data means first hand information

• personal investigation

Through investigation

• Through questionnaire

Through local source

Through telephone

Through internet

Direct investigation

interview method.

Nominal Scale

It can be define as "The classification of the observation into mutually exclusive qualitative classes is said to be nominal scale".

i) students are classified as male and female. we may use number 1 and 2.

iii) Rain fall 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.