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Section

A

Subject

probability and statistics

Submitted to

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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	3	1
4	3	3	0	5	2	1	4	3	3
5	3	3	6	3	3	2	2	7	3
1	4	2	4	4	4	6	8	10	7
7	5	6	5	3	2	3	9	2	2

Solution

(a)

Grouped frequency Distribution

Largest value = 10

Smallest value = 0

$$\text{Range} = 10 - 0 = 10$$

We decide to take 5 classes of equal size

$$h = \frac{10}{5} = 2$$

So we take

$$h = 2.1$$

Class Weight	Class Boundaries	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	8.3	#	5	48
8.4-10.4	8.35 - 10.45	9.4	"	2	50
Total				50	

Ungrouped frequency Distribution:

No of Childrens	Tally	Frequency	C. Frequency
0		1	1
1		4	5
2	#	8	13
3	# # #	14	27
4	# # "	7	34
5	# #	5	39
6		4	43
7		4	46
8	"	3	48
9	"	2	49
10	"	1	50
Total		50	

(b)

Grouped frequency Distribution:

Mode:

$$M_1 = 1 + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times h$$

Here;

$$I = 2.05$$

$$f_m = 21$$

$$f_1 = 13$$

$$f_2 = 9$$

$$h = 2.1$$

$$M_1 = 2.05 + \frac{(21 - 13)}{(21 - 13) + (21 - 9)} \times 2.1$$

$$M_1 = 2.89 \approx 3$$

$$M_1 = 3$$

$n = 56$
 $\frac{n}{2} = 25$
C.f = 34

Median:

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

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

So,

$$l = 2.05$$

$$h = 2.1$$

$$f = 21$$

$$c = 13$$

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

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

$$= 3.25 \approx 3$$

$$\underline{\text{Median} = 3}$$

Ungrouped frequency Distribution:

Mode:

In ungrouped data the highest frequency is 14 so the number of childrens in front of 14 is 3.

Thus

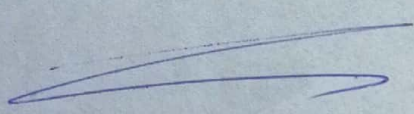
$$\text{Mode} = 3$$

Median:

Our data is even as it is 50

So,

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

$$\text{Median} = 25$$


Q No 2

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

Classes	2-4	6-8	10-12	14-16	18-20	22-24	26-28	30-32	34-36
F	3	13	6	10	5	3	5	3	2

Classes	Class boundary	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
		$\Sigma = 50$	

F	3	13	6	10	5	3	5		
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Calculate all Quartiles and Deciles ?

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

12.5 lies in 5-9 class boundary

$$\begin{aligned} Q_1 &= l + \frac{h}{f} \left(\frac{n}{4} - c \right) \\ &= 5 + \frac{4}{13} \left(\frac{50}{4} - 3 \right) \\ &= 5 + 0.30 (12.5 - 3) \end{aligned}$$

$$\boxed{Q_1 = 7.85}$$

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

25 lies in 13-17 class boundary

So

$$\begin{aligned} Q_2 &= l + \frac{h}{f} \left(\frac{2n}{4} - c \right) \\ &= 13 + \frac{4}{10} \left(\frac{2 \times 50}{4} - 22 \right) \end{aligned}$$

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

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

$$= 13 + 1.2$$

$$\boxed{Q_2 = 14.2}$$

$$Q_3 = \frac{3n}{4} = \frac{2 \times 50}{4} \Rightarrow 37.5$$

37.5 lies in 21-25 class boundary

So

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

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

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

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

$$= 21 + 0.67$$

$$\boxed{Q_3 = 21.67}$$

Deciles

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

4 lies in 5-9 class boundary

Hence

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

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

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

$$= 5 + 0.61$$

$$\boxed{D_1 = 5.61}$$

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

10 lies in 5-9

Hence

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

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

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

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

$$D_2 = 5 + 2.15$$

$$\boxed{D_2 = 7.15}$$

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

15 lies in 5-9 class boundary

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

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

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

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

$$D_3 = 5 + 3.69$$

$$\boxed{D_3 = 8.69}$$

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

20 lies in 9-13 class boundary

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

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

$$\boxed{D_4 = 11.67}$$

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

25 lies in 13-17 class boundary

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

$$D_5 = 13 + \frac{4}{10} \left(\frac{5 \times 50}{10} - 20 \right)$$

$$13 + \frac{4}{10} (25 - 20)$$

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

$$\boxed{D_5 = 14.2}$$

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

30 lies in 13-17 class boundary

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

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

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

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

$$\boxed{D_6 = 16.2}$$

$$D_7 = \frac{7n}{10} \Rightarrow \frac{7 \times 50}{10} = 35 \quad 35 \text{ lie in } 17-21 \text{ class. } B$$

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

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

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

$$\boxed{D_7 = 19.4}$$

$$D_8 = \frac{8n}{10} \Rightarrow \frac{8 \times 50}{10} \Rightarrow 40 \quad 40 \text{ lies } 21-25 \text{ class boundary}$$

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

$$= 21 + \frac{4}{5} \left(\frac{8 \times 50}{10} - 37 \right)$$

$$D_8 = 21 + \frac{4}{3} (3)$$

$$= 21 + 4$$

$$\boxed{D_8 = 25}$$

$$D_9 = \frac{9n}{10} \Rightarrow \frac{9 \times 50}{10} \quad \frac{450}{10} = 45 \quad \text{lie in } 25-29 \cdot \text{CB}$$

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

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

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

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

$$D_9 = 25 + 4$$

$$\boxed{D_9 = 29}$$

Q No 3 Define the following

- (a) Random statistics
- (b) Inferential statistics
- (c) Descriptive statistics
- (d) Source of primary data
- (e) Nominal Scale

Ans

(a) Random statistics:: In statistics a random variable is an assignment of numerical value to each possible outcome of an event space. These association facilitates the identification and calculation of probabilities of each event.

(b) Inferential statistics Inferential statistic is procedure for making Inferences about the characteristic that describe the large group of data or the whole (population) from the knowledge derived from only a part of the data. known as sample. This area includes the estimation of population parameters and testing of statistical hypothesis is called Inferential statistics.

(c) Descriptive statistics

Descriptive statistics is that branch of statistics which deal with concepts of methods concerned with summarization and description of important aspects of numerical data. is called descriptive statistics.

(d) Source of primary data.

primary data mean first hand information.

- personal Investigation
- Through Investigator
- Through Questionnaire
- Through Lead Source
- Through telephone
- Through Internet
- Direct Investigation
- Interview method.

(e) Nominal Scale The classification or grouping of the observations into mutually exclusive qualitative categories or classes is called nominal scale.