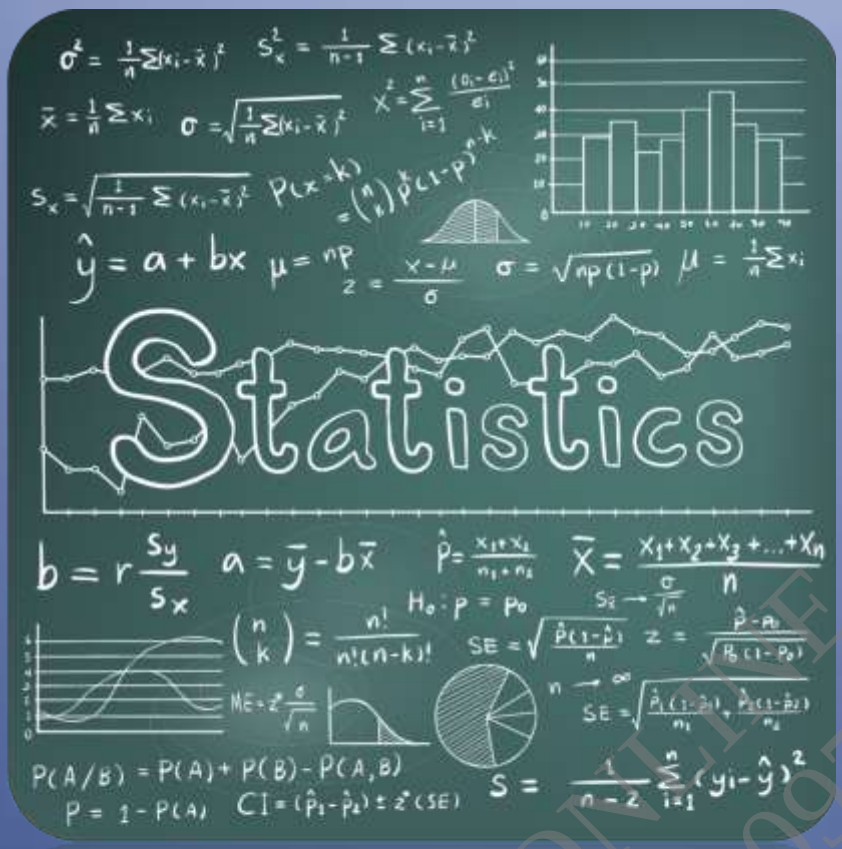


CHAPTER 4

STATISTICS

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EXERCISE 4.1

CHAPTER 4 STATISTICS

Question # 1

If the mean of 5 observations $x,\ x+2,\ x+4,$ $x+6\ and\ x+8$ is 11. Find the value of x

Solution:

$$Mean = \bar{X} = \frac{\sum x}{n}$$

$$11 = \frac{x + x + 2 + x + 4 + x + 6 + x + 8}{5}$$

$$55 = 5x + 20$$

$$55 - 20 = 5x$$

$$35 = 5x$$

$$5x = 35$$

$$x = 7$$

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EXERCISE 4.1

CHAPTER 4 STATISTICS

Question # 2

If the mean of 25 observations is 27 and each observation is decreased by 7, what will be the new mean?

Solution:

$$\text{Mean} = \frac{Sum\ of\ Observations}{Number\ of\ Observations}$$

Hence

$$Sum\ of\ observations\ = Frequency \times Mean$$
$$Sum\ of\ observations\ = 25 \times 27 = 675$$

If each observation is decreased by 7, then total decrease = $25 \times 7 = 175$

Now, we will subtract 175 from the sum of Observations = 675 – 175 = 500

New Sum of Observations = 500

$$\text{New Mean} = \frac{\text{New Sum of Observations}}{25} = \frac{500}{25} = 20$$

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EXERCISE 4.1 CHAPTER 4 STATISTICS

Question # 3

Compute the mean of the following data.

Class	1 – 3	3 – 5	5 – 7	7 – 9
Frequency	12	22	27	19

Solution:

Class	f	x	fx
1 – 3	12	2	24
3 – 5	22	4	88
5 – 7	27	6	162
7 – 9	19	8	152
	$\sum f = 80$		$\sum fx = 426$

$$Mean = \bar{X} = \frac{\sum fx}{\sum f} = \frac{426}{80} = 5.325$$

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EXERCISE 4.1 CHAPTER 4 STATISTICS

Question # 4

In a hospital, the ages of diabetic patients were recorded as follows. Find the median age.

Age (in year)	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75
No. of patients	5	20	40	50	25

Solution:

Age (in year)	0 – 15	15 – 30	30 – 45	**45 – 60**	60 – 75
No. of patients	5	20	40	**50**	25
CF	5	25	**65**	115	140

$$l = 45\ ;\ \ f = 50;\ \ cf = 65;\ \frac{N}{2} = \frac{140}{2} = 70\ ;h = 15$$

$$Median = l + \left\{h \times \left(\frac{\frac{N}{2} - cf}{f}\right)\right\}$$

$$Median = 45 + \left\{15 \times \left(\frac{70 - 65}{50}\right)\right\}$$

$$Median = 45 + \left\{15 \times \frac{5}{50}\right\}$$

$$Median = 45 + 1.5 = 46.5$$

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EXERCISE 4.1	CHAPTER 4 STATISTICS

Question # 5

Compute the median from the following data

Marks	0 – 7	7 –14	14 – 21	21 – 28	28 – 35	35 – 42	42 – 49
No. of students	3	4	7	11	0	16	9

Solution:

Marks	0 – 7	7 –14	14 – 21	21 – 28	28 – 35	**35 – 42**	42 – 49
No. of students	3	4	7	11	0	**16**	9
CF	3	7	14	25	**25**	41	50

$$l = 35\,;\ \ f = 16;\ \ cf = 25;\ \frac{N}{2} = \frac{50}{2} = 25\,;h = 7$$

$$Median = l + \left\{h \times \left(\frac{\frac{N}{2} - cf}{f}\right)\right\}$$

$$Median = 35 + \left\{7 \times \left(\frac{25 - 25}{15}\right)\right\}$$

$$Median = 35 + \left\{7 \times \frac{0}{15}\right\}$$

$$Median = 35 + 0 = 35$$

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EXERCISE 4.1 CHAPTER 4 STATISTICS

Question # 6

Find the median from the following data

Marks	No. of Students
Below 10	12
Below 20	32
Below 30	57
Below 40	80
Below 50	92
Below 60	116
Below 70	164
Below 80	200

Solution:

Marks	CF	F
0 – 10	12	12
10 – 20	32	32 – 12 = 20
20 – 30	57	57 – 32 = 25
30 – 40	80	80 – 57 = 23
40 – 50	92	92 – 80 = 12
50 – 60	**116**	**116 – 92 = 24**
60 – 70	164	164 – 116 = 48
70 – 80	200	200 – 164 = 36

$$l = 50;\ \ f = 24;\ \ cf = 92;\ \ \frac{N}{2} = \frac{200}{2} = 100\,;h = 10$$

$$Median = l + \left\{ h \times \left(\frac{\frac{N}{2} - cf}{f} \right) \right\}$$

$$Median = 50 + \left\{ 10 \times \left(\frac{100 - 92}{24} \right) \right\}$$

$$Median = 50 + \{3.33\}$$

$$Median = 50 + 3.33 = 53.33$$

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EXERCISE 4.1	CHAPTER 4 STATISTICS

Question # 7

Find the mode of the following frequency distribution.

Marks	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Frequency	12	35	45	25	13

Solution:

Marks	10 – 20	20 – 30	**30 – 40**	40 – 50	50 – 60
Frequency	12	**35**	**45**	**25**	13

Model class can be selected where Highest frequency is given

$$f_k = 45 \; ; \quad f_{k-1} = 35 \; ; f_{k+1} = 25 \; ; x_k = 30; h = 10$$

Mode

$$M_o = x_k + h\left\{\frac{f_k - f_{k-1}}{2(f_k) - f_{k-1} - f_{k+1}}\right\}$$

$$M_o = 30 + 10\left\{\frac{45 - 35}{2(45) - 35 - 25}\right\}$$

$$M_o = 30 + 10\left\{\frac{10}{90 - 60}\right\}$$

$$M_o = 30 + \left\{\frac{100}{30}\right\}$$

$$M_o = 30 + 3.33 = 33.33$$

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EXERCISE 4.1	CHAPTER 4 STATISTICS

Question # 8

Compute the mode of the following data.

Class	0 – 20	20 – 40	40 – 60	60 – 80	80 –100
Frequency	25	16	28	20	5

Solution:

Class	0 – 20	20 – 40	**40 – 60**	60 – 80	80 –100
Frequency	25	**16**	**28**	**20**	5

Model class can be selected where Highest frequency is given

$f_k = 28$; $f_{k-1} = 16$; $f_{k+1} = 20$; $x_k = 40; h = 20$

Mode

$$M_o = x_k + h\left\{\frac{f_k - f_{k-1}}{2(f_k) - f_{k-1} - f_{k+1}}\right\}$$

$$M_o = 40 + 20\left\{\frac{28 - 16}{2(28) - 16 - 20}\right\}$$

$$M_o = 40 + 20\left\{\frac{12}{56 - 36}\right\}$$

$$M_o = 40 + \left\{\frac{240}{20}\right\}$$

$$M_o = 40 + 12 = 52$$

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