

RD Sharma
Solutions
Class 11 Maths
Chapter 32
Ex 32.3

Statistics Ex 32.3 Q1

We have to calculate mean deviation from the median. So, first we calculate the median.

CI	x	f	cf	d = (x-med)	fd
0-10	5	5	5	20	100
10-20	15	10	15	10	100
20-30	25	20	35	0	0
30-40	35	5	91	10	50
40-50	45	10	101	20	200
		50			450

$$\text{M.D} = \frac{1}{n} \sum f_i |d_i| = \frac{1}{50} [450] = 9$$

Statistics Ex 32.3 Q2(i)

CI	x	f	xf	d=(x-mean)	fd
0-100	50	4	200	308	1232
100-200	150	8	1200	208	1664
200-300	250	9	2250	108	972
300-400	350	10	3500	8	80
400-500	450	7	3150	92	644
500-600	550	5	2750	192	960
600-700	650	4	2600	292	1168
700-800	750	3	2250	392	1176
		50	17900		7896

$$\text{Mean} = \frac{1}{n} \sum f_i x_i = \frac{17900}{50} = 358$$

$$\therefore \text{M.D} = \frac{1}{n} \sum f_i |d_i| = \frac{1}{50} [7896] = 157.92$$

Statistics Ex 32.3 Q2(ii)

Classes	f_i	x_i	d_i	$f_i d_i$	$ x_i - \bar{X} $	$f_i x_i - \bar{X} $
95-105	9	100	-3	-27	28.58	257.22
105-115	13	110	-2	-26	18.58	241.54
115-125	16	120	-1	-16	8.58	137.28
125-135	26	130	0	0	1.42	36.92
135-145	30	140	1	30	11.42	342.6
145-155	12	150	2	24	21.42	257.04
	$N = 106$		$Total = -15$			$Total = 1272.60$

$$N = 106$$

$$a = 130$$

$$h = 10$$

$$\bar{X} = a + h \left(\frac{\sum f_i d_i}{N} \right) = 128.58$$

$$M.D = \frac{\sum f_i |x_i - \bar{X}|}{N} = \frac{1272.60}{106} = 12.005$$

Statistics Ex 32.3 Q2(iii)

CI	x	f	xf	$d = (x - \text{mean})$	fd
0-10	5	6	30	22	132
10-20	15	8	120	12	96
20-30	25	14	350	2	28
30-40	35	16	560	8	128
40-50	45	4	180	18	72
50-60	55	2	110	28	56
		50	1350		512
	Mean		27		
	Mean Deviation		10.24		

$$\text{Mean} = \frac{1}{n} \sum f_i x_i = \frac{1350}{50} = 27$$

$$\therefore M.D = \frac{1}{n} \sum f_i |d_i| = \frac{1}{50} [512] = 10.24$$

Statistics Ex 32.3 Q3

Find the mean deviation from the mean for the data:

Classes	0-10	10-20	20-30	30-40	40-50	50-60
Frequencies	6	8	14	16	4	2

$$\text{Mean} = \frac{1}{n} \sum f_i x_i = \frac{5390}{110} = 49$$

$$\therefore \text{M.D} = \frac{1}{n} \sum f_i |d_i| = \frac{1}{110} [1644] = 14.95$$

Statistics Ex 32.3 Q4

We have to calculate mean deviation from the median. So, first we calculate the median.

CI	x	f	cf	d = (x-med)	fd
17-19.5	18.25	5	5	20	100
20-25.5	22.75	16	21	15.5	248
26-35.5	30.75	12	33	7.5	90
36-40.5	38.25	26	59	0	0
41-50.5	45.75	14	73	7.5	105
51-55.5	53.25	12	85	15	180
56-60.5	58.25	6	91	20	120
61-70.5	65.75	5	96	27.5	137.5
		96			980.5

We have $N = 96 \Rightarrow N/2 = 48$

The cumulative frequency just greater than $N/2$ is 59 and the corresponding value of x is 38.25.

Hence, median = 38.25

$$\therefore \text{M.D} = \frac{1}{n} \sum f_i |d_i| = \frac{1}{96} [980.5] = 10.21$$

Statistics Ex 32.3 Q5

M.D from Median

Marks	Students	x_i	Cum.Freq	$ d_i = \left x_i - \frac{70}{3} \right $	$f_i d_i$
0-10	5	5	5	$\frac{55}{3}$	$\frac{275}{3}$
10-20	8	15	13	$\frac{25}{3}$	$\frac{200}{3}$
20-30	15	25	28	$\frac{5}{3}$	$\frac{75}{3}$
30-40	16	35	44	$\frac{35}{3}$	$\frac{560}{3}$
40-50	6	45	50	$\frac{65}{3}$	$\frac{390}{3}$

$N = 50$

Total = 500

$$\text{Median} = l + \frac{\frac{N}{2} - F}{f} \times h = 20 + \frac{30 - 25}{15} \times 10 = 20 + \frac{10}{3} = \frac{70}{3}$$

$$M.D = \frac{500}{50} = 10$$

M.D from mean

Marks	Students	x_i	$d_i = \frac{x_i - 35}{10}$	$f_i d_i$	$ x_i - 27 $	$f_i x_i - 27 $
0-10	5	5	-3	-15	22	110
10-20	8	15	-2	-16	12	96
20-30	15	25	-1	-15	2	30
30-40	16	35	0	0	8	128
40-50	6	45	1	6	18	108

$N = 50$

Total = -40

Total = 472

$$\bar{X} = 35 + 10 \times \frac{-40}{50} = 27$$

$$M.D = \frac{472}{50} = 9.44$$

Converting the given data into continuous frequency distribution by subtracting 0.5 from the lower limit and adding 0.5 to the upper limit of each class interval.

Age	x_i	f_i	Cumulative frequency	$ d_i = x_i - 38 $	$f_i d_i $
15.5 - 20.5	18	5	5	20	100
20.5 - 25.5	23	6	11	15	90
25.5 - 30.5	28	12	23	10	120
30.5 - 35.5	33	14	37	5	70
35.5 - 40.5	38	26	63	0	0
40.5 - 45.5	43	12	75	5	60
45.5 - 50.5	48	16	91	10	160
50.5 - 55.5	53	9	100	15	135
		$N = \sum f_i = 100$			$\sum f_i d_i = 735$

Clearly, $N = 100 \Rightarrow \frac{N}{2} = 50$.

Cumulative frequency is just greater than $\frac{N}{2}$ is 63 and the corresponding class is 35.5 - 40.5.

$l = 35.5$, $f = 26$, $h = 5$, $F = 37$

Therefore, median = $l + \frac{\frac{N}{2} - F}{f} \times h = 35.5 + \frac{50 - 37}{26} \times 5 = 38$

M.D. = $\frac{1}{N} \sum f_i |d_i| = \frac{735}{100} = 7.35$

Statistics Ex 32.3 Q7

Classes	f_i	x_i	$f_i x_i$	$ x_i - 9.2 $	$f_i x_i - 9.2 $
0-4	4	2	8	7.2	28.8
4-8	6	6	36	3.2	19.2
8-12	8	10	80	0.8	6.4
12-16	5	14	70	4.8	24.0
16-20	2	18	36	8.8	17.6
	$N = 25$		$Total = 230$		$Total = 96.0$

$$Mean = \frac{230}{25} = 9.2$$

$$M.D. = \frac{96}{25} = 3.84$$

Statistics Ex 32.3 Q8

Classes	f_i	x_i	$f_i x_i$	$ x_i - 14.1 $	$f_i x_i - 14.1 $
0-6	4	3	12	11.1	44.4
6-12	5	9	45	5.1	25.5
12-18	3	15	45	0.9	2.7
18-24	6	21	126	6.9	41.4
24-30	2	27	54	12.9	25.8
	$N = 20$		$Total = 282$		$Total = 139.8$

$$Mean = \frac{282}{20} = 14.1$$

$$M.D. = \frac{139.8}{20} = 6.99$$