EXERCISE 32.3 PAGE NO: 32.16

1. Compute the mean deviation from the median of the following distribution:

Class	**0-10**	**10-20**	**20-30**	**30-40**	**40-50**
Frequency	**5**	**10**	**20**	**5**	**10**

Solution:

To find the mean deviation from the median, firstly let us calculate the median.

Median is the middle term of the X_i,

Here, the middle term is 25

So, Median = 25

Class Interval	x_i	f_i	Cumulative Frequency	$\|d_i\| = \|x_i - M\|$	$f_i \|d_i\|$
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
		Total = 50			Total = 450

$$MD = \frac{1}{n}\sum_{i=1}^{n}|d_i|$$

= 1/50 × 450

= 9

∴ The mean deviation is 9

2. Find the mean deviation from the mean for the following data:

(i)

Classes	**0-100**	**100-200**	**200-300**	**300-400**	**400-500**	**500-600**	**600-700**	**700-800**
Frequencies	**4**	**8**	**9**	**10**	**7**	**5**	**4**	**3**

Solution:

To find the mean deviation from the mean, firstly let us calculate the mean.

By using the formula,

$$Mean = \frac{\sum f_i x_i}{f_i}$$

= 17900/50

= 358

Class Interval	x_i	f_i	Cumulative Frequency	$\|d_i\| = \|x_i - M\|$	$f_i \|d_i\|$
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
		Total = 50	Total = 17900		Total = 7896

N = 50

$$MD = \frac{1}{n}\sum_{i=1}^{n}|d_i|$$

= 1/50 × 7896

= 157.92

∴ The mean deviation is 157.92

(ii)

Classes	**95-105**	**105-115**	**115-125**	**125-135**	**135-145**	**145-155**
Frequencies	**9**	**13**	**16**	**26**	**30**	**12**

Solution:

To find the mean deviation from the mean, firstly let us calculate the mean.

By using the formula,

$$Mean = \frac{\sum f_i x_i}{f_i}$$

= 13630/106

= 128.58

Class Interval	x_i	f_i	Cumulative Frequency	$\|d_i\| = \|x_i - M\|$	$f_i \|d_i\|$
95-105	100	9	900	28.58	257.22
105-115	110	13	1430	18.58	241.54
115-125	120	16	1920	8.58	137.28
125-135	130	26	3380	1.42	36.92
135-145	140	30	4200	11.42	342.6

145-155	150	12	1800	21.42	257.04
		N = 106	Total = 13630		Total = 1272.6

N = 106

$$MD = \frac{1}{n}\sum_{i=1}^{n}|d_i|$$

= 1/106 × 1272.6

= 12.005

∴ The mean deviation is 12.005

3. Compute mean deviation from mean of the following distribution:

Marks	**10-20**	**20-30**	**30-40**	**40-50**	**50-60**	**60-70**	**70-80**	**80-90**
No. of students	**8**	**10**	**15**	**25**	**20**	**18**	**9**	**5**

Solution:

To find the mean deviation from the mean, firstly let us calculate the mean.

By using the formula,

$$Mean = \frac{\sum f_i x_i}{f_i}$$

= 5390/110

= 49

Class Interval	x_i	f_i	Cumulative Frequency	$\|d_i\| = \|x_i - M\|$	$f_i \|d_i\|$
10-20	15	8	120	34	272
20-30	25	10	250	24	240
30-40	35	15	525	14	210
40-50	45	25	1125	4	100
50-60	55	20	1100	6	120
60-70	65	18	1170	16	288
70-80	75	9	675	26	234
80-90	85	5	425	36	180
		N = 110	Total = 5390		Total = 1644

N = 110

$$MD = \frac{1}{n}\sum_{i=1}^{n}|d_i|$$

= 1/110 × 1644

= 14.94

∴ The mean deviation is 14.94

4. The age distribution of 100 life-insurance policy holders is as follows:

Age (on nearest birthday)	**17-19.5**	**20-25.5**	**26-35.5**	**36-40.5**	**41-50.5**	**51-55.5**	**56-60.5**	**61-70.5**
No. of persons	**5**	**16**	**12**	**26**	**14**	**12**	**6**	**5**

Calculate the mean deviation from the median age.

Solution:

To find the mean deviation from the median, firstly let us calculate the median.

N = 96

So, N/2 = 96/2 = 48

The cumulative frequency just greater than 48 is 59, and the corresponding value of x is 38.25

So, Median = 38.25

Class Interval	x_i	f_i	Cumulative Frequency	$\|d_i\| = \|x_i - M\|$	$f_i \|d_i\|$
17-19.5	18.25	5	5	20	100
20-25.5	22.75	16	21	15.5	248
36-35.5	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
		Total = 96			Total = 980.5

N = 96

$$MD = \frac{1}{n}\sum_{i=1}^{n}|d_i|$$

= 1/96 × 980.5

= 10.21

∴ The mean deviation is 10.21

5. Find the mean deviation from the mean and from a median of the following

distribution:

Marks	**0-10**	**10-20**	**20-30**	**30-40**	**40-50**
No. of students	**5**	**8**	**15**	**16**	**6**

Solution:

To find the mean deviation from the median, firstly let us calculate the median.

N = 50

So, N/2 = 50/2 = 25

The cumulative frequency just greater than 25 is 58, and the corresponding value of x is 28

So, Median = 28

By using the formula to calculate Mean,

$$Mean = \frac{\sum f_i x_i}{f_i}$$

= 1350/50

= 27

Class Interval	x_i	f_i	Cumulative Frequency	$\|d_i\| = \|x_i$ – Median$\|$	$f_i \|d_i\|$	F_iX_i	$\|X_i$ – Mean$\|$	$F_i \|X_i$ – Mean$\|$
0-10	5	5	5	23	115	25	22	110
10-20	15	8	13	13	104	120	12	96
20-30	25	15	28	3	45	375	2	30
30-40	35	16	44	7	112	560	8	128
40-50	45	6	50	17	102	270	18	108
		N = 50			Total = 478	Total = 1350		Total = 472

Mean deviation from Median = 478/50 = 9.56

And, Mean deviation from Median = 472/50 = 9.44

∴ The Mean Deviation from the median is 9.56 and from mean is 9.44.