COST L2

Mean, Median and Mode of grouped data/frequency distribution

Quick Revision

Measures of Central Tendency

- Mean- Average
- Median- Middle value
- Mode- value with more frequency

- Two variables X, Y assumes the values $X_1=2$, $X_2=-5$, $X_3=4$ $X_4=-8$ and $Y_1=-3$, $Y_2=-8$, $Y_3=10$, $Y_4=6$. Calculate-
 - $\sum XY$
 - $\sum X \sum Y$
 - $\sum XY^2$
 - $\sum X^2$
 - $\sum (X-Y)(X+Y)$

Solution

•
$$\sum XY$$

- $\sum X \sum Y$
- $\sum XY^2$
- $\sum X^2$
- $\sum (X-Y)(X+Y)$

X	Y	X^2	Y^2	XY	XY^2
					,

Arithmetic mean of frequency distribution

A.M of Raw Data

$$X = 4 \ 5 \ 6 \ 8$$

$$\bar{X} = \frac{\sum X}{N}$$

$$=\frac{4+5+6+8}{4}$$

A.M of Frequency Distribution

$$X = 4 \ 5 \ 6 \ 8$$

$$\bar{X} = \frac{\sum fX}{\sum f}$$

$$= \frac{4 \times 2 + 5 \times 3 + 6 \times 4 + 8 \times 1}{2 + 3 + 4 + 1}$$

• The following table gives the height of 100 students at XYZ college. Find the mean height of the student.

Height (inches)	No of students
60-62	5
63-65	18
66-68	42
69-71	27
72-74	8
	100

AM for grouped data

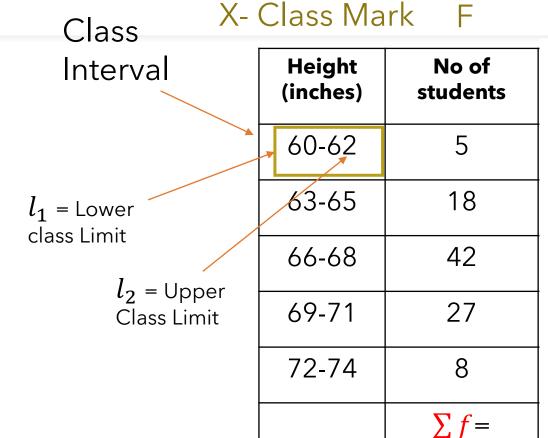
$$\overline{X} = \frac{\sum fX}{\sum f} = ???$$

Class mark-

Mid-point of class interval

$$X = \frac{l_1 + l_2}{2}$$

Class mark of class 60-62 is 61



 Use the following frequency distribution of weekly wages to find A.M. of wage of employees at P & R company.

Weekly Wage (\$)	No of employees
250-259	8
260-269	10
270-279	16
280-289	14
290-299	10
300-309	5
310-319	2

Median for the grouped data

Median Class- The class interval for which cumulative frequency is just greater that N/2

Median =
$$l_1 + \left\{ \frac{(l_2 - l_1)}{f} \left(\frac{N}{2} - c.f. \right) \right\}$$

Where,

 l_1 = lower class boundary of the median class

 l_2 = upper class boundary of the median class

f = frequency of median class

c. f = cumulative frequency **preceding** the median class

$$N = \sum f$$

Median for grouped data

Class	Frequency <i>f</i>
118-126	3
127-135	5
136-144	9
145-153	12
154-162	5
163-171	4
172-180	2

Median =
$$l_1 + \left\{ \frac{(l_2 - l_1)}{f} \left(\frac{N}{2} - c.f. \right) \right\}$$

Median Class- The class interval for which cumulative frequency is just greater that N/2

$$\frac{N}{N} = \sum f = 40$$

$$\frac{N}{2} = 20$$

Locate class for which *c.f.* is just greater than $\frac{N}{2}$

Median Class

$$l_1 = 145$$

$$l_2 = 153$$

$$f = 12$$

$$c.f. = 17$$

• Find the median.

Marks more than	5	10	15	20	25	30
No of Students	2	3	8	7	6	4

Mode for the grouped data

Modal Class- The class interval with maximum frequency

Mode =
$$l_1 + \left\{ (l_2 - l_1) \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \right\}$$

Where,

 l_1 = lower class boundary of the modal class

 l_2 = upper class boundary of the modal class

 f_0 = frequency of the class preceding modal class

 f_1 = frequency of the modal class

 f_2 = frequency of the class succeeding modal class

Mode for grouped data

Viewing time (mins)	No of students <i>f</i>
9.3-9.7	2
9.8-10.2	5
10.3-10.7	12 _{f0} ←
10.8-11.2	17 f1 🛧
11.3-11.7	14 f2 ←
11.8-12.2	6
12.3-12.7	3
12.8-13.2	1

Mode =
$$l_1 + \left\{ (l_2 - l_1) \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \right\}$$

Modal Class- The class interval with maximum frequency

Frequencycy preceeding modal classHighest frequency

Frequencycy succeeding modal class

Modal Class
$$l_1 = 10.8$$
 $l_2 = 11.2$

Mode =
$$????$$

Viewing time (mins)	No of students
300-399	14
400-499	46
500-599	58
600-699	76
700-799	68
800-899	62
900-999	48
1000-1099	22
1100-1199	6

• Find MODE