
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

Question

- 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

F= 2 3 4 1

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

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

Question-

- 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

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

Class mark-
Mid-point of class interval

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

Class mark of class 60-62 is 61

Class Interval

X- Class Mark F

Height (inches)	No of students
60-62	5
63-65	18
66-68	42
69-71	27
72-74	8
	$\sum f =$

l_1 = Lower class Limit

l_2 = Upper Class Limit

Question

- 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

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

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 *f*
118-126	3
127-135	5
136-144	9
145-153	12
154-162	5
163-171	4
172-180	2

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

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

$N = \sum f = 40$

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

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

Median= ????

Question

- 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

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

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 *f*	
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	

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

Modal Class- The class interval with maximum frequency

$Frequencycy\ preceeding\ modal\ class$

$Highest\ frequency$

$Frequencycy\ succeeding\ modal\ class$

Modal Class

l_1= 10.8

l_2 =11.2

Mode = ????

Question

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