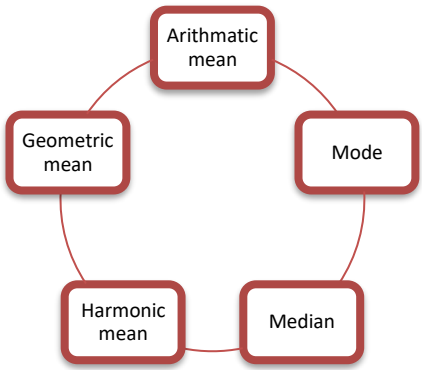
Measures of Central Tendency.

Meaning = Average or Central Value

Methods of Central Tendency



Measures of Central Tendency

Mean	Median	Mode
•Mathematical average data	•Position average	•Most frequency /most common observation of data

Mean

Arithmetic mean	Geometric Mean	Harmonic Mean
•Simple Average	•Ratio •Rate & % •Average	•Average •Rate •Speed

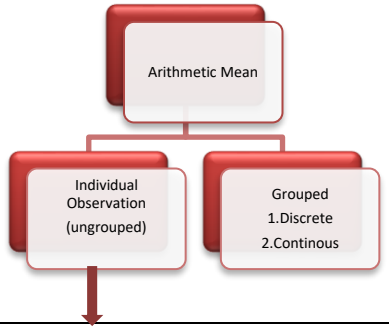
Relation Between AM,GM,HM

Observation are Different → • AM>GM>HM

Observation are same → • AM≥GM≥HM

Mode= 3median – 2mean

MO = 3MD – 2M



$$\bar{X} = \frac{\Sigma xi}{n}$$

$$\Sigma xi = \frac{x1 + x2 + x3 \ldots\ldots\ldots\ldots + xm}{N}$$

Example : 4Km,5Km,6km,8km

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

$$= 5.75 \text{ km}$$

Discrete	
Weight	No of Students
20 25 30 35	4 {20,20,20,20} 3 {25,25,25} 2 {30,30} 1 {35}

$$\bar{X} = \frac{\Sigma fixi}{\Sigma fi} \text{ or } \frac{\Sigma xf}{N}$$

X	***F***	F_x
20	4	80
25	3	75
30	2	60
35	1	35
Total	10	250

$$= \frac{\Sigma xf}{N} = \frac{250}{10} = 25$$

Short-cut Method

X	***F***	***d=X_i – A***	***fd***
20	5	-10	-50
25	4	-5	-20
30 = A	3	0	0
35	2	5	10
40	1	10	10
	15		-50

$\bar{X} = A + \frac{\Sigma fidi}{N}$

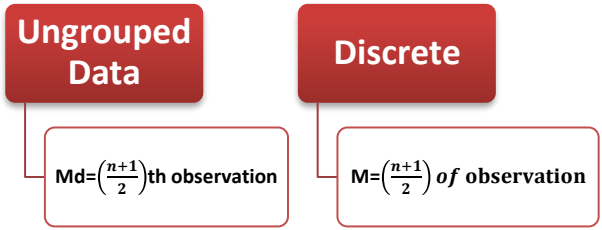
A = Assumed Mean
fi = Frequency
di = x_i – A
[di = Deviation About mean also called Shifting of Origin]

$\bar{X} = A + \frac{\Sigma fidi}{N}$

$\bar{X} = 30 + \frac{(-50)}{15}$

$\bar{X} = 26.67$

Median


Ungrouped Data
Md=$\left(\frac{n+1}{2}\right)$th observation
Discrete
M=$\left(\frac{n+1}{2}\right)$ of observation

Median

Ungrouped Data

Eg: 8,9,2,3,4,5,1,0,
0,1,2,3,4,5,8,9

Md = $\left(\frac{n+1}{2}\right)$ *th observation*

= $\left(\frac{8+1}{2}\right)$ *th observation*

= 4.5th observation

Discrete

X	*f*	*c*
0	5	5
1	7	12
2	9	21
3	3	24

M= $\left(\frac{n+1}{2}\right)$ *th of observation*

= $\left(\frac{24+1}{2}\right)$ *th of observation*

= 12.5

Z= 2

12.5 comes under 21

Eg:

Class	*f*	*C*
0-10	5	$5 \longrightarrow f$
10-20	7 (*f*)	12
20-30	3	15
30	5	20

$$M = L + \frac{\frac{n}{2} - F}{f} \times C$$

$$M = \left(\frac{n}{2}\right) th\ observation$$

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

$$= 10$$

$$M = L + \frac{\frac{n}{2} - F}{f} \times C$$

$$= 10 + \frac{10-5}{7} \times 10$$

$$= 12.857$$

Mode

Individual

- z = Most Frequency Observatiomn of data

Eg: 1,2,3,8,2,4,2

$\therefore Z = 2$

D

- z =Obervation having Max. Frequency

X	f
5	17
7	21
9	22
11	18

$\therefore Z = 9$

C

- $Z = L + \frac{f1 - f0}{2f - f0 - f2} \times c$

Class	Frequency
0-10	20
10-20	25
20-30	15 (f_0)
30-40	30 (f_1)
40-50	10 (f_2)

$\therefore Model\ class = 30 - 40$

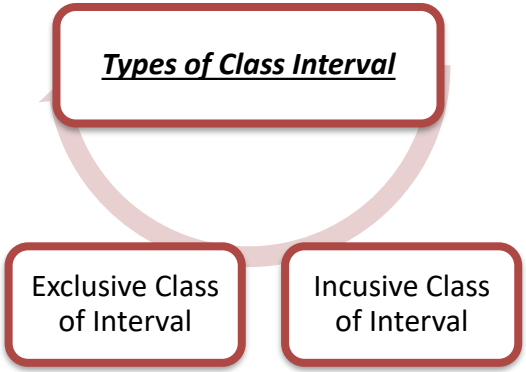
L=10

$Z = 10 + \frac{30-15}{2\times15-15-10} \times 10$

$= 10 + \frac{15}{30-15-10} \times 10$

$= 10 + \frac{15}{3} \times 10$

Z = 60



- ***Exclusive Class Interval***

Weight	No.of Students	Calculations
0-10	3	0-9.99
10-20	4	10-19.99
20-30	2	20-29.99
30-40	5	30-39.99
40-50	1	40-49.99

- ***Inclusive Class Interval***

Weight	No.of students	Calculations
1-10	3	0.5-10.5
11-20	4	10.5-20.5
21-30	2	20.5-30.5
31-40	5	30.5-40.5
41-50	1	40.5-50.5

For Converting Inclusive Into exclusive Difference

U/W L_2 & L_1 is Divided by 2

$\frac{1}{2} = 0.5 \longrightarrow L_1$(-)

L_2(+)

Now to …….

Weight	No of Student
0.5-10.5	3
10.5-20.5	4
20.5-30.5	2
30.5-40.5	5
40.5-50.5	1