14 Statistics

3 Central Tendency → Mean, Median & Mode

Q→ What is the relation between 3 central tendency?

Ans→ $\text{Mode} = 3\,\text{Median} - 2\,\text{Mean}$

Mean ($\bar{x}$) or Average $= \dfrac{\text{Sum of all observations}}{\text{Total number of observations}}$ → 9th Class

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$ Direct Method

$$\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$$ Assumed mean method

$$\bar{x} = a + \left(\frac{\sum f_i u_i}{\sum f_i}\right) \times h$$ Step-Deviation Method

f_i → frequency

x_i → class marks

Lower Limit (10) – (15) → Upper Limit

15 – 20

20 – 25

a = assumed mean

h → class size or width

$d_i = x_i - a$

$u_i = \dfrac{d_i}{h}$

$h = U - L$

$x_i = \dfrac{U+L}{2} = \dfrac{10+15}{2} = \dfrac{25}{2} = 12.5$

a → We take any value from all x_i's (Take mid value) for easy calculation

assumed mean

Mode → most frequent observation

or

observation having maximum frequency → Class 9th

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

Modal Class = class having maximum frequency

↳ eg:- (50-60)

l → 50

h → class size

$h = 60 - 50 = 10$

Class Interval	f
(40-50)	5 → f_0
(50-60)	9 → f_1
(60-70)	3 → f_2

Median :-

If n = odd

$$\text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{observation}$$

If n = even

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{th} \text{obs.} + \left(\frac{n}{2}+1\right)^{th} \text{obs.}}{2}$$

→ Class 9th

$$\text{Median} = l + \left(\frac{\frac{n}{2} - c.f}{f} \right) \times h \longrightarrow \text{Class } 10^{th}$$

Median class = $\frac{n}{2}$ से बड़ी जो c.f. होती है वो Median Class होती है

eg:-

Total frequency $n = 20$

Class Interval	f	c.f
40 – 50	3	3
50 – 60	5	8
60 – 70	2	10
70 – 80	7	17

Median Class ← 70 – 80

l

$f \rightarrow$ frequency of median class

$c.f \rightarrow$ median class से पहले वाली

$h \rightarrow$ class size

$l \rightarrow$ lower limit of median class

example :-

f frequency	less than type (c.f) cumulative frequency	more than type (cf) cumulative frequency
5	5	18
3	8	13
4	12	10
3	15	6
3	18	3

f → less than type c.f. 1st same then add + (ऊपर से)

f → more than type c.f 1st same then add + (~~नीचे~~ से)

Less than type ogive

(x, y)

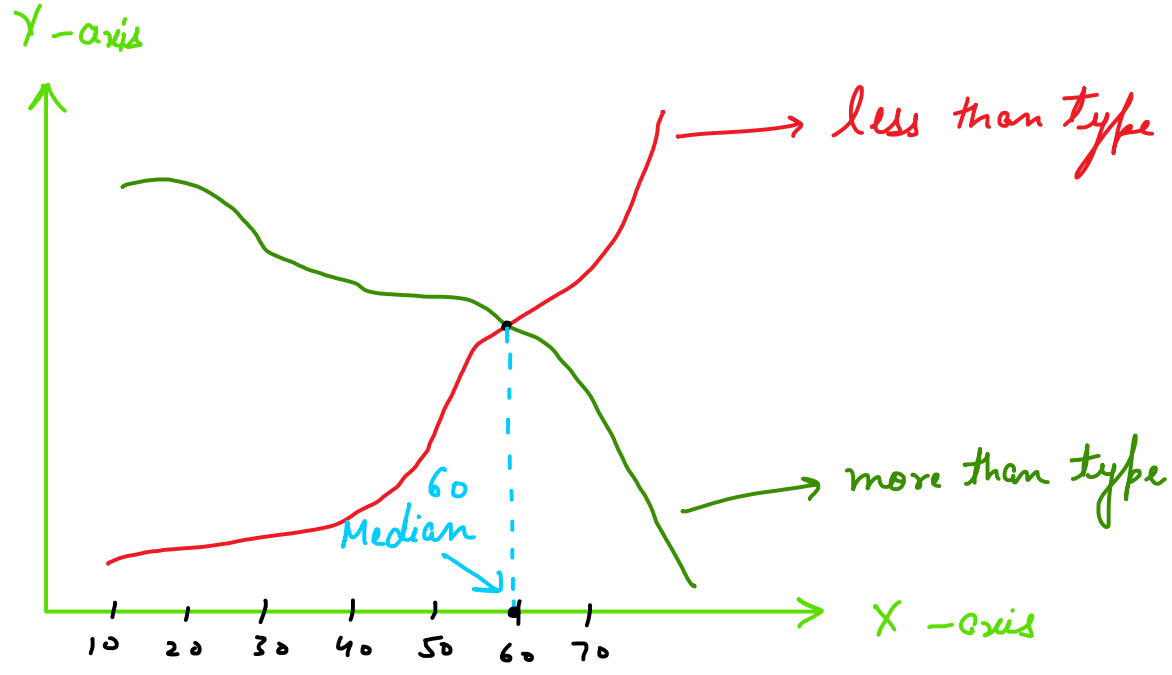
- x → Upper Limit
- y → less than type c.f.

More than type ogive

(x, y)

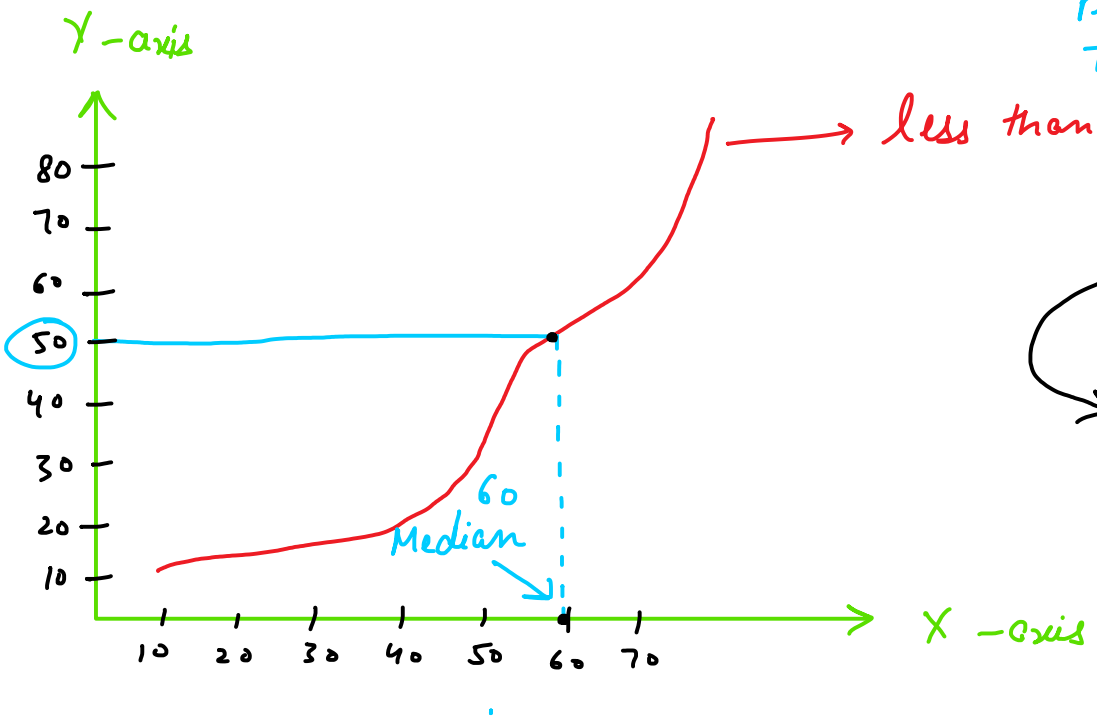
- x → Lower Limit
- y → more than type c.f.

Q → Draw less than type & more than type ogive and also find median.



Q How to find median from 1 ogive. Locate $\frac{n}{2}$ on (Y-axis)

→ Parallel line X-axis
Perpendicular on X-axis
Touch X-axis (Median)



example :-

n → Total frequency

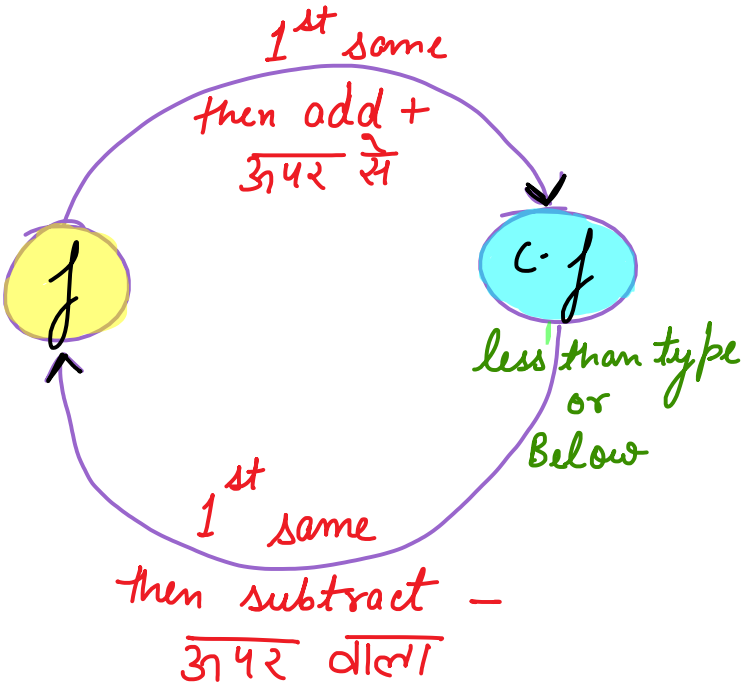
n = 100

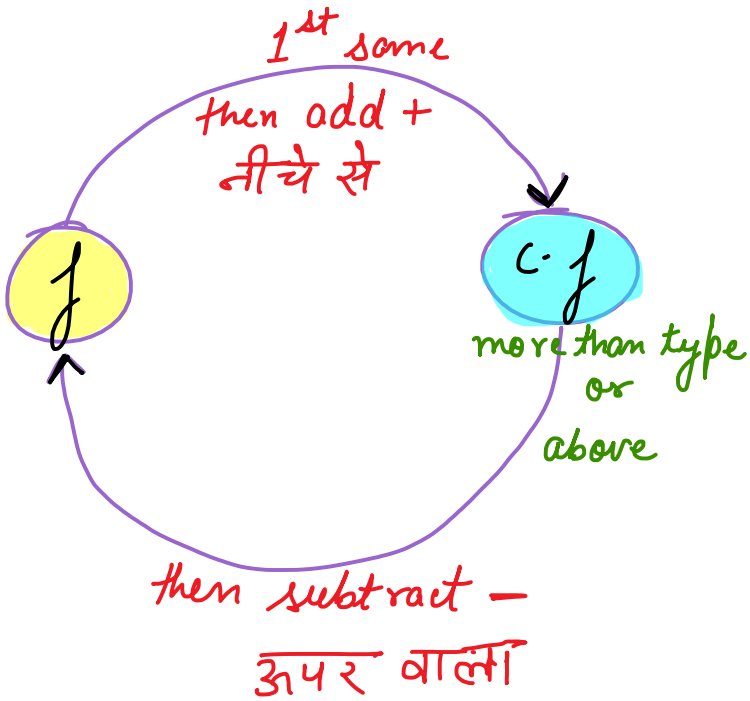
$\frac{n}{2}$ = 50

Class Interval

Less than type → Upper Limit

More than type → Lower Limit


1st same
then add +
ऊपर से
f
c.f
less than type
or
Below
1st same
then subtract –
ऊपर वाला


1st same
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