Mode

Recall:- Median → Middle Value of the data.

formula:-

$N \rightarrow$ no of observations

Individual observations: Size of $\left(\frac{N+1}{2}\right)^{th}$ item.

Discrete observations: Size of $\left(\frac{N+1}{2}\right)^{th}$ item ; $N = \sum f$

$\sum f$ → Cumm. freq preceding the median class

Continuous observations: $L + \frac{\frac{N}{2} - cf}{f} \times i$

- L → Lower limit of Median class
- i → length of CI
- f → frequency of Median class

Mode

Mode is the value which occurs most frequently in a set of observations and around which the other items of the set cluster densly.

Ex:- Consider the following frequency distribution

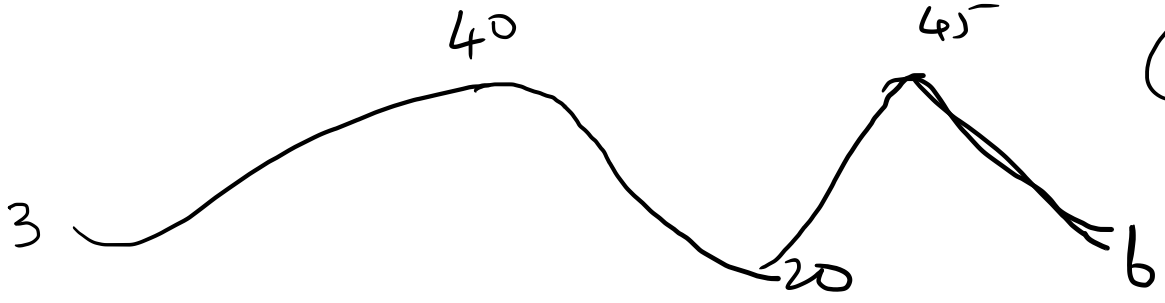
x:	1	2	3	4	5	6	7	8
f:	4	9	16	25	22	15	7	3

Mode = 4.

Ex 2:- Consider the following frequency distribution:

x	1	2	3	4	5	6	7	8	9	10	11	12
f	3	8	15	23	35	40	32	28	20	45	14	6

Mode: ~~10~~ (Highest frequency)



Irregular data

Relation between mean, Median & Mode

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

Continuous observation

$$\text{Mode} = L + \frac{\Delta_1}{\Delta_1 + \Delta_2} \times i$$

- L → Lower limit of modal class.
- i → Length of the CI.
- $\Delta_1 = f_1 - f_0$
- $\Delta_2 = f_1 - f_2$
- f_1 → frequency of modal class
- f_0 → frequency preceding the modal class
- f_2 → frequency succeeding the modal class

→ Find the mode for the following

CI :	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f :	5	8	7	12	28	20	10	10

Soln highest frequency $f_1 = 28$. $\therefore f_0 = 12$; $f_2 = 20$

Modal class is 40-50. $L = 40$. $i = 10$.

$$\text{Mode} = L + \frac{\Delta_1}{\Delta_1 + \Delta_2} \times i ;$$

$\Delta_1 = f_1 - f_0 = 28 - 12 = 16$

$\Delta_2 = f_1 - f_2 = 28 - 20 = 8$

$$= 40 + \frac{(16)}{16+8} \times 10 = 40 + \frac{160}{24}$$

$$= 46.666 \text{ (approx)}$$

x	C_1 f	C_2	C_3	C_4	C_5	C_6
1	3	11				
2	8		23	26		
3	15	38			46	
4	23		58			73
5	35	75		98	107	
6	40		72			100
7	32	60				
8	28		48	80		
9	20	65			93	
10	45		59			79
11	14	20		65		
12	6					

C_1 → frequency

C_2 → Sum of two frequency (consecutive)

C_3 → omit the I freq & sum the two consec. freq.

C_4 → Sum of 3 consec. freq

C_5 → omit the I freq & sum the three consec. freq

C_6 → omit the first freq & sum the three consec. freq

{Identify Max in each column}.

$C_1 \rightarrow 45 \rightarrow 10$ ✓

$C_2 \rightarrow 75 \rightarrow 5, 6$ ✓

$C_3 \rightarrow 72 \rightarrow 6, 7$ ✓

$C_4 \rightarrow 98 \rightarrow 4, 5, 6$ ✓

$C_5 \rightarrow 107 \rightarrow 5, 6, 7$ ✓

$C_6 \rightarrow 100 \rightarrow 6, 7, 8$ ✓

x	f
4	1
5	3
6	5
7	3
8	1
10	1

Mode = 6