

Median

<https://youtu.be/FMj2i-IvaZU>

- **Prerequisites**

- 4.1) Mean
- 2) Introduction to Measure of Central Tendency- Mean, Median, Mode
- 1) Representation of Data in Statistics- Ungrouped, Grouped Data Distribution(Discrete & Continuous)

- **What is Median?**

It is a value separating higher half with the lower half of data sample, a population, or probability distribution

OR

Middle value of dataset

- **Why it is Important?**

In Presence of Outliers concepts of mean, variance, standard deviation, etc get

corrupted.

- **Finding Median**

- 1. **Type1 (Sequential Data)**

- **Steps**

Steps

① Write data in \uparrow^{ing} order (or \downarrow^{ing})

② \rightarrow If n is odd then $(\frac{n+1}{2})^{th}$ observation will be median

\rightarrow If n is even, the median will be A.M. of $(\frac{n}{2})^{th}$ & $(\frac{n}{2} + 1)^{th}$ observation.

○ Question 1

Q1) 7, 11, 3, -5, 12, 18, 17

Ans → -5, 3, 7, 11, 12, 17, 18 (\uparrow ^{ing} order)
→ number of observations = 7
→ odd
⇒ median: $\left(\frac{7+1}{2}\right)^{\text{th}}$ observation = 4th observation
⇒ median = 11

○ Question 2

Q2) 1, 1, 2, 3, 1, 5, 7, 11, 17

Ans 1, 1, 1, 2, 3, 5, 7, 9, 11, 17

median ⇒ 5th & 6th observation
⇒ $\frac{3+5}{2} = 4$ (∵ even number of observation)

2. **Type2** (Grouped with Single Class Value)

Steps

- Steps
- ① Arranging table in \uparrow ing or \downarrow ing order of value of observation.
 - ② Find sum of frequency & prepare cumulative freq column if $n (=f_1 + f_2 + \dots + f_R)$ is odd then median will be value cumulative frequency of which contains $(\frac{n+1}{2})^{\text{th}}$ observations.

OR

if $n = \text{even}$ then find A.M of values CF of which contain $(\frac{n}{2})^{\text{th}}$ & $(\frac{n}{2} + 1)^{\text{th}}$ observations.

Explanation

x_i	f_i	Cf_i
2	10	10
3	15	25
5	25	50
7	15	65

$\Rightarrow 2, 2, 2, \dots, 2, 3, 3, 3, \dots, 3, 3, 5, 5, 5, 5, 5, 7, \dots, 7$

Median will be $\frac{65+1}{2} = 33^{\text{rd}}$
 \Rightarrow will be 5

\leftarrow If freq total were 100
 $\Rightarrow 50^{\text{th}}$ & 51^{st}
 $\Rightarrow 50^{\text{th}}$ lie here & 51^{st} will lie here
 \Rightarrow take mean of 5 & 7
 $= 6$

○ Question 1

Q)

x_i	f_i
10	5
20	15
30	16
40	4

○ Answer 1

Ans

x_i	f_i	Cf
10	5	5
20	15	20
30	16	36
40	4	40

AM of 20^{th} & 21^{st}
 = median
 = $\frac{20+30}{2}$
 = 25

3. **Type3** (Grouped with Class Value in Interval)

Steps

~~Steps~~

- Write values in table in \uparrow order
- Identify median class in which $\left(\frac{n}{2}\right)^{\text{th}}$ observation or $\left(\frac{n+1}{2}\right)^{\text{th}}$ observation lies
 - even
 - odd
- median = $n = x_0 + \left(\frac{\frac{n}{2} - f_1}{f_m} \right) \cdot l$
 - lower limit of class interval of median class
 - frequency of median class
 - length of median class
 - cumulative freq. of prev. class
 - total no. of observations (freq. sum)

Question 1

Q)

x_i	f_i
0-9	10
10-19	12
20-29	20
30-39	18

Answer 1