

STATISTICSMEAN

1. Formula to find mean when individual observations $x_1, x_2, x_3, \dots, x_n$ (ungrouped data) are given is

$$\text{Mean} = \frac{\text{sum of observations}}{\text{Total number of observations}}$$

$$X = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

$$X = \frac{\sum x_i}{n}$$

2. Formula to find mean when observations $x_1, x_2, x_3, \dots, x_n$ along with the corresponding frequencies $f_1, f_2, f_3, \dots, f_n$ are given (grouped data) is

$$\text{Mean} = \frac{\text{sum of product of frequencies along with corresponding observations}}{\text{Sum of frequencies}}$$

$$X = \frac{f_1x_1 + f_2x_2 + f_3x_3 + \dots + f_nx_n}{f_1 + f_2 + f_3 + \dots + f_n}$$

$$X = \frac{\sum f_1x_1}{\sum f_1}$$

$$X = \frac{\sum f_1x_1}{N} \text{ (Note : finding mean using this formula is called Direct method)}$$

3. Formula to find mean when class interval are given (grouped data with C.I)

$$X = a + \frac{h}{N} (\sum f_1a_1) \text{ (Note : finding mean using this formula is called Step deviation).}$$

* $a \rightarrow$ Assumed mean

* $h \rightarrow$ Class size (length or width of the class)

* $u_i \rightarrow x_i - a/h$, where $x_i - a = d_i$ (deviation)

* $N \rightarrow$ Sum of frequencies

4. Formula to find mean by using Assumed mean (or) shortcut method

$$X = a + 1/N (\sum f_i d_i)$$

* $a \rightarrow$ Assumed mean

* $d_i = x_i - a$ (deviation)

* $N \rightarrow$ Sum of frequencies

Median

- * Formula to find median when individual observations $x_1, x_2, x_3, \dots, x_n$ (ungrouped data) are given is

Case I : If $n = \text{odd} \Rightarrow M = ((n+1)/2)\text{th observation}$

Case II : If $n = \text{even} \Rightarrow M = \frac{\left(\frac{n}{2}\right)\text{th observation} + \left(\frac{n}{2}+1\right)\text{th observation}}{2}$

- * Formula to find median when observations (x_i) along with corresponding frequencies (f_i) are given is
M = the observation opposite to the cumulative frequency which is just greater than $N/2$ value

- * Formula to find median when class intervals (grouped data) are given

$M = l + ((n/2 - cf)/f) * h$; where

$f \Rightarrow$ Median frequency (opposite to median class)

$cf \Rightarrow$ Cumulative frequency just preceding the median frequency

$l \Rightarrow$ Lower unit of the median class

$N \Rightarrow$ Sum of all frequencies

$h \Rightarrow$ Class size (length of the class)

Mode

- * Formula to find Mode when individual observations (ungrouped data) are given is

Mode (Z) = 'The observation' which occurs most frequently.

- * Formula to find Mode when class intervals (grouped data) are given is

$\text{Mode (Z)} = l + ((f_1 - f_0)/(2f_1 - f_0 - f_2)) * h$

$f_1 \Rightarrow$ Modal frequency (highest frequency).

$f_0 \Rightarrow$ Frequency just preceding modal frequency.

$f_2 \Rightarrow$ Frequency just succeeding modal frequency.

$l \Rightarrow$ lower limit of the modal frequency.

$h \Rightarrow$ class size.

- * **EMPERICAL** Relation between Mean, Median and Mode is given by

$$\text{Mode(Z)} = 3\text{Median(M)} - 2\text{Mean}(\bar{x})$$