

## Central Tendency

Central Tendency refers to the measure used to determine the center of a distribution data. It is used to find a single score that is most representative of an entire data set. Mean will be used for almost all occasions.

### Find mean median and mode of grouped data :

Here we are going to see how to find mean median and mode of grouped data.

#### Mean :

Arithmetic mean (AM) is one of the measures of central tendency which can be defined as the sum of all observations divided by the number of total observations.

#### Median :

Median is defined as the middle value of the data when the data is arranged in ascending or descending order.

#### Mode :

If a set of individual observations are given, then the mode is the value which occurs most often.

Let us look into some example problems to understand how to find mean, median and mode of the grouped data.

A measure of center is a value at the center or middle of a data set.

Mean: the (arithmetic) mean of a set of values is the number obtained by adding the values and dividing the total by the number of values.

Notation

$\Sigma$ : The uppercase Greek letter sigma; indicates a summation of values

X: A variable used to represent the individual data vales

n: Number of values in a sample (sample size)

N: Number of values in a population.

$\mu$ : The lowercase Greek letter mu; the population mean

$\bar{x}$ : Read as "x bar"; the sample mean

Round –off rule ( for the measure of center): carry one more decimal place than is present in the original set of values. When applying this rule, round only the final answer, not intermediate values that occur during calculations. Example 1: What is the mean price of the air conditioners? 500, 840, 470, 480, 420, 440, 440.

Mean always exists.  It takes every value in a calculation.  It is affected by extreme values (very sensitive).  Works well with many statistical methods.

To clear the sensitivity of the mean to extreme values, we define another measure of center called Median.

Median: the median of a data set is the middle value when the data values are arranged in ascending or descending order. If the data set has an even number of

entries, the median is the mean of the two middle data entries. The Median is often denoted by (“x-tilde”).

Example 2: Find the median for a) 4, 6, 1, 3, 2 b) air conditioner prices given in example 1.

Median is commonly used, always exists, and not sensitive to extreme values.

Mode: The mode of a data set is the value that occurs most frequently. When two values occur with the same greatest frequency, each one is a mode and the data set is bimodal. When more than two values occur with same greatest frequency, each is a mode and data set is said to be multimodal. When no value is repeated, we say there is no mode.

Example 3: find the modes of the following data sets.

A) 5, 5, 5, 3, 1, 5, 1, 4, 3, 5

B) 1, 2, 2, 2, 3, 4, 5, 6, 6, 6, 7, 9

c) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Midrange: the midrange is the measure of center that is the value midway between the maximum and minimum values in the original data set. It is found by adding the maximum data value to the minimum data value and then dividing the sum by 2.

Example 4: find the midrange for 5.40, 1.10, 0.42, 0.73, 0.48, 1.10

Mean from a frequency distribution

The mean from a frequency distribution for a sample is approximated by

Where  $x$  and  $f$  are the midpoints and frequencies of a class, respectively.

$$\bar{x} = \frac{\sum f x}{n} \quad \bar{x} = \frac{\text{lower limit} + \text{upper limit}}{2}$$

Guidelines: Finding the mean from a frequency distribution

1. Find the midpoint of each class.
2. Find the sum of the products of the mid points and the frequencies.
3. Find the sum of the frequencies.
4. Find the mean from the frequency distribution.

Example5: Approximate the mean from the frequency distribution. The heights (in inches) of 16 female students in a physical education class.

Height	f
60-62	3
63-65	4
66-68	7
69-71	2

Weighted Mean: When the values of data set are varying in their degree of importance, we may want to weight them accordingly. Weighted mean:  $\bar{x} = \frac{\sum w.x}{\sum w}$

Example 6: Find the mean of 3 tests with scores of 85, 90, 75 where the first test counts for 20%, second test counts for 30%, and the third test counts for the 50%.