given by

$$M_0 = x_l + \frac{f_m - f_{m-1}}{2f_m - f_{m-1} - f_{m+1}} \times c \quad \cdots (4i)$$

where x_l is the lower class boundary of the modal class and we take three consecutive classes with the modal classes in the middle whose frequencies are f_{m-1}, f_m and f_{m+1}, c is the width of the modal class.

Example 4.11

Calculate the median and mode for the following frequency distribution:

Height (inches) :	60-62	63-65	66-68	69-71	72-74
Frequency :	5	18	42	27	8

Solution: First we form the following table for necessary calculations

Table 3.5

NECESSARY CALCULATIONS

Height (inches)	Frequency	class-boundaries	Cumulative frequency (< type)
60-62	5	59.5 — 62.5	5
63-65	18	62.5 — 65.5	23
66-68	42	65.5 — 68.5	65
69-71	27	68.5 — 71.5	92
72-74	8	71.5 — 74.5	100
Total	100	—	—

Here $n = 100$, $\frac{n}{2} = 50$

So, the class containing the median is 65.5 – 68.5

So, Median $= 65.5 + \frac{50-23}{42} \times 3 = 65.5 + 1.93 = 67.43$ (inches)

Again from 2nd column of Table 3.5 we see that modal class is 65.5 – 68.5.

Now mode $= x_l + \frac{f_m - f_{m-1}}{2f_m - f_{m-1} - f_{m+1}} \times c$, symbols having usual meaning

Here $x_l = 65.5$, $f_{m-1} = 18$, $f_m = 42$, $f_{m+1} = 27$, $c = 3$

So, mode $= 65.5 + \frac{42-18}{2\times42-18-27} = 65.5 + 1.85 = 67.35$ (inches)

Another approximate relation between mean, median and mode from which mode can be calculated is

$$\text{mean} - \text{mode} = 3(\text{mean} - \text{median}) \quad \cdots (4j)$$

3.2 Requirements of an ideal average

An ideal average should possess the following characteristics. It should be

(a) rigidly defined,

(b) based on all the observations,

(c) capable of simple interpretation

(d) easy to compute

(e) readily amenable to algebraic treatment,

(f) more or less stable from sample to sample (of the same size and from the same population)

3.3. Comparison between Mean, Median and Mode.

The mean and mode are rigidly defined. The median is also rigidly defined, except when there is an even number of observations.

In finding each of these measures, all the observations are taken into consideration. However, only the mean is directly based on all the values and its value changes even if a single observation is altered. On the other hand, median and mode may remain unchanged even after the alteration of several observations.

The significance of all the measures is quite easily comprehensible.

In general, the labour involved in computation of all the three measures is almost same. But in practice, the exact dermination of mode of a continuous variable is impossible because we never get an ideal distribution (or the frequency curve)

The mean has several properties and by virtue of them it can be readily manipulated in varied situations. But the Median and mode do not possess such desirable properties.

~~Here $n = 100$, $\frac{n}{2} = 50$~~

~~So, the class interval containing median is 65.5 - 68.5~~

~~Median $= 65.5 + \frac{50-23}{42} \times 3 = 65.5 + 1.95 = 67.43$ (inches).~~

~~Again from the ... column of Table~~

Among the three measures, the mean is found to be least effected by sampling fluctuations. However, in this respect, the median or mode may be better in some specific situations. Thus it is evident that, in general, mean is the best measure of central tendency. But there are situations where mean can not be used or should not be used. In the case of grouped frequency distribution, if one or both of the terminal classes are open, mean is indeterminate. Again, if there be a few extreme values markedly different from majority of the values, mean should not be used as an average. In such situation, median or mode would be appropriate measure.

3.4 Geometric mean (G.M) and Harmonic Mean (H.M)

The geometric mean (G.M) and the Harmonic Mean (H.M) are two averages, which, though not very popular, are found to be suitable in some specific situations. The geometric mean of a set of n values of a variable is the nth root of their product.