

## 17. Mean & Basic Statistics

Arithmetic mean of the numbers  $a$  and  $b = a + b/2$

Geometric mean of the numbers  $a$  and  $b = \sqrt{ab}$ , if  $a > 0$  and  $b > 0$

Comparing an arithmetic mean and a geometric mean:  $a + b/2 \geq \sqrt{ab}$ , if  $a > 0$  and

$b > 0$

If a given number is split into two parts, then the product of the two parts will be the highest when they are equal.

If a given number is split into two positive multiplicative parts, then the sum of the two parts will be the least when the two parts are the square roots of the number.

Arithmetic mean – The A.M of  $x_1, x_2, \dots, x_n$  is

$$\frac{x_1 + x_2 + \dots + x_n}{n}.$$

Geometric mean – The G.M of  $x_1, x_2, \dots, x_n$  is

$$\sqrt[n]{x_1 \times x_2 \times \dots \times x_n}$$

Harmonic mean – The H.M of  $x_1, x_2, \dots, x_n$  is

$$\frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \dots + \frac{1}{x_n}}$$

Median – To calculate the median of a given set of numbers, arrange the frequencies in the ascending order, if the number of elements is odd, the median is  $(n + 1)/2$ th term and if even then the average of the two middle terms is the median of the whole group.

Mode – The value occurring with the maximum frequency is called the mode.

$A.M \geq G.M \geq H. M$ , and all of them are equal if all the values of  $x_i$  are equal.

If  $x_1, x_2, \dots, x_n$  are points in the data, and if  $\bar{x}$  is the mean, then Variance

$$= \frac{\sum (x_i - \bar{x})^2}{n}$$

Standard Deviation =  $\sqrt{\text{Variance}}$