False Position Method (or) Regula Falsi Method

In mathematics, an ancient method of solving an equation in one variable is the **false position method** (method of false position) or **regula falsi method**. In simple words, the method is described as the trial and error approach of using “false” or “test” values for the variable and then altering the test value according to the result. In this article, you will learn how to solve an equation in one variable using the false position method. Also, get solved examples on the regula falsi method here.

Consider an equation f(x) = 0, which contains only one variable, i.e. x.

To find the real root of the equation f(x) = 0, we consider a sufficiently small interval (a, b) where a < b such that f(a) and f(b) will have opposite signs. According to the intermediate value theorem, this implies a root lies between a and b.

Also, the curve y = f(x) will meet the x-axis at a certain point between A[a, f(a)] and B[b, f(b)].

Now, the equation of the chord joining A[a, f(a)] and B[b, f(b)] is given by:

$$y - f(a) = \frac{f(b)-f(a)}{(b-a)}.(x-a)$$

Let y = 0 be the point of intersection of the chord equation (given above) with the x-axis. Then,

$$-f(a) = \frac{f(b)-f(a)}{(b-a)}.(x-a)$$

This can be simplified as:

$$\frac{-f(a)(b-a)}{f(b)-f(a)} = x - a$$
$$\frac{af(a)-bf(a)}{f(b)-f(a)} + a = x$$
$$\Rightarrow x = \frac{af(a)-bf(a)+af(b)-af(a)}{f(b)-f(a)}$$
$$\Rightarrow x = \frac{af(b)-bf(a)}{f(b)-f(a)}$$

Thus, the first approximation is x1 = [af(b) – bf(a)]/ [f(b) – f(a)]

Also, x1 is the root of f(x) if f(x1) = 0.

If f(x1) ≠ 0 and if f(x1) and f(a) have opposite signs, then we can write the second approximation as: x2 = [af(x1) – x1f(a)]/ [f(x1) – f(a)]

Similarly, we can estimate x3, x4, x5, and so on.

Geometrical representation of the roots of the equation f(x) = 0 can be shown as: