Regula Falsi Method

Formula :

$$x_{n+1} = \frac{x_{n-1}f(x_n) - x_n f(x_{n-1})}{f(x_n) - f(x_{n-1})}, \quad n = 1, 2, 3, \dots \dots \dots$$

Example : *Find the root of the equation* $x^2 - 1 = 0$ *by Regula Falsi Method.*

Solution : $f(x) = x^2 - 1$

$f(0) = (0)^2 - 1 = -1,$ *which is negative*

$f(1) = (1)^2 - 1 = 0$

$f(2) = (2)^2 - 1 = 3,$ *which is positive*

So, root of $x^2 - 1$ *lies in between* 0 *and* 2, *because* $f(0).f(2) < 0$

x_{n-1}	x_n	$x_{n+1} = \frac{x_{n-1}f(x_n) - x_n f(x_{n-1})}{f(x_n) - f(x_{n-1})}$	$f(x_{n+1}) = (x_{n+1})^2 - 1$
0	2	$\frac{(0 \times 3) - (2 \times (-1))}{(3 - (-1))} = 0.5$	$(0.5)^2 - 1 = -0.75$
0.5	2	$\frac{(0.5 \times 3) - (2 \times (-0.75))}{(3 - (-0.75))} = 0.8$	$(0.8)^2 - 1 = -0.36$
0.8	2	$\frac{(0.8 \times 3) - (2 \times (-0.36))}{(3 - (-0.36))} = 0.92857$	$(0.92857)^2 - 1 = -0.13776$
0.92857	2	$\frac{(0.92857 \times 3) - (2 \times (-0.13776))}{(3 - (-0.13776))} = 0.97561$	$(0.97561)^2 - 1 = -0.04819$
0.97561	2	$\frac{(0.97561 \times 3) - (2 \times (-0.04819))}{(3 - (-0.04819))} = 0.99180$	$(0.99180)^2 - 1 = -0.01633$
0.99180	2	$\frac{(0.99180 \times 3) - (2 \times (-0.01633))}{(3 - (-0.01633))} = 0.99726$	$(0.99726)^2 - 1 = -0.00547$
0.99726	2	$\frac{(0.99726 \times 3) - (2 \times (-0.00547))}{(3 - (-0.00547))} = 0.99909$	$(0.99909)^2 - 1 = -0.00182$
0.99909	2	$\frac{(0.99909 \times 3) - (2 \times (-0.00182))}{(3 - (-0.00182))} = 0.99970$	$(0.99970)^2 - 1 = -0.00060$
0.99970	2	$\frac{(0.99970 \times 3) - (2 \times (-0.00060))}{(3 - (-0.00060))} = 0.99990$	$(0.99990)^2 - 1 = -0.00020$