

2) False position (Regular False method)

$$= - , i = 1, 2, 3, \dots$$

Example Find the root of $f(x) = x \log x - 1$ in $[1, 2]$ with $\epsilon = 0.001$

$$= 1, f(1) = -1, = 2, f(2) = 0.3863$$

$$= - = 1.72134459, f(1.72134459) = -0.59402$$

$$= - = 1.89017687, f(1.89017687) = -0.477361475$$

$$= 0.16883228 \quad 0.001$$

$$= - = 1.76315, f(1.76315) = -0.565755088$$

$$= 0.12702687 \quad 0.001$$

$$= - = 1.76322$$

$$= 0.00013 \quad 0.001$$

The root is

3) Secant method

$$= - , i = 0.1, 2, 3, \dots$$

Example Find the root of $f(x) = x - 1$ in $[-1, 2]$, $x_0 = 0, x_1 = 1$ with $\epsilon = 0.05$

$$= f(0) = -1, f(1) = 1, 18$$

$$= - = 0.368, f(0.368) = -0.468$$

$$= 0.4680.05$$

$$x_1 = 0.503, f(x_1) = -0.168$$

$$x_2 = 0.1680.05$$

$$x_3 = 0.580, f(x_3) = 0.036$$

$$x_4 = 0.0360.05$$

The root is

4) Newton Raphson method

Let $f(x)$ be differentiable function on $[a,b]$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}, n = 0, 1, 2, 3, \dots$$

Example Find the root of $f(x) = x^2 - 1$ with $x_0 = 0$

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

$$f'(x) = 2x$$

$$x_1 = 0.5$$

$$x_2 = 0.4$$

The root is

Example Find the square root of a number n

$$X = \sqrt{n}$$

$$F(x) = -n, (x) = 2x$$

$$= - = - =)$$

Example Find

$$X = , n = , F(x) = n - , (x) =$$

$$= - = - = (2-n)$$

5) Fixed point iterative theorem

A fixed point of a function $g(x)$ is a real number x such that $g(x) = x$

The iteration $x_{n+1} = g(x_n)$, $n = 0, 1, 2, \dots$ is called fixed point iteration

Example Find the root of $f(x) = -x - 3$ in $[2, 3]$, $\epsilon = 2.5$

$$X = 1 + = (x)$$

$$X = -3 = (x)$$

$$X = = (x)$$

$$X = = (x)$$