SECANT METHOD

Basic Concept

The Secant Method is a numerical technique used to find the root of a nonlinear equation

$F(x)=0$

It is similar to the Newton–Raphson method but **does not require derivatives**.
Instead, it uses a **secant line** passing through two previous approximations.

Formula

$$x_{n+1} = x_n - f(x_n)\frac{x_n - x_{n-1}}{f(x_n) - f(x_{n-1})}$$

Algorithm

1. Choose two initial guesses x0 and x1 .
2. Calculate the next approximation using the secant formula.
3. Check the stopping condition:

$$|x_{n+1} - x_n| < \text{tolerance}$$

4. Repeat the process until the required accuracy is achieved.

Stopping Criteria

- Difference between two successive values is less than tolerance
- Maximum number of iterations is reached

Advantages

- Faster than Bisection and False Position methods
- Does not require derivative
- Easy to implement

Applications

Used in engineering and scientific problems where derivative evaluation is difficult.