

Secant Method

Instructions

1. *Use Python3*
2. *Use any editor of your choice (eg: Atom) to implement the Algorithm*
3. *Run your Implementation against the given Test Equations*
4. *Research and provide additional Test Equations*
5. *Push the Code and Test Output on Github*
6. *Publish the link on Moodle*

Aim

Implement the Secant Method in Python.

Background

In Numerical Analysis, the Secant Method is a Root-Finding Algorithm that uses a succession of roots of Secant Lines to better approximate a Root of a function $f(x)$.

The Secant Method can be thought of as a finite difference approximation of ***Newton's Method***.

The Algorithm

1. Given an equation $f(x) = 0$. Initially choose two different estimates, say x_{n-1} and x_{n-2} these can be any numbers.
2. Now compute x_n using the below equation :-

$$x_n = f(x_{n-1}) \frac{x_{n-1} - x_{n-2}}{f(x_{n-1}) - f(x_{n-2})}$$

3. Calculate $f(x_n)$

1. **Case 1:** If $f(x_n)$ is less than the Permissible Error, then Print Root and **Terminate**.

2. **Case 2 :** Else :

$$x_{n-2} = x_{n-1}$$

$$x_{n-1} = x_n$$

Repeat from Step 2.

Assignment

1. Implement the Secant Method in Python

2. Find root for the below equations:

i.

$$f(x) = x^3 - 20$$

ii.

$$f(x) = \cos(x) + 2\sin(x) + x^2$$

Reference

https://en.wikipedia.org/wiki/Secant_method