Bisection Method

Problem Set 1

September 18, 2019

1 Problem

Estimate root of a polynomial $f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$ using **Bisection** and **False-Position** method. Stop iterations if ϵ_a becomes less than ϵ_s or $maxitr$ no. of iterations are already completed.

2 Input

x_l : float (initial lower bound)
x_u : float (initial upper bound)
x_t : float (true value)
ϵ_s : float (error tolerance)
$maxitr$: int (maximum no. of iterations allowed)
n : int (highest degree of $f(x)$)
$coefficients$: a list of floats (It will contain the coefficients $a_0, a_1, a_2, \ldots, a_n$)

3 Output

For each iteration, print $x_l, x_u, x_r, \epsilon_a, \epsilon_t$
Print the final estimated root

4 calculating $f(x)$

function FUNC(x)
    $i \leftarrow 0$
    $fun \leftarrow 0$
    while $i \leq n$ **do**
        $fun \leftarrow fun + coefficients[i] * x^i$
        $i \leftarrow i + 1$
    end while
end function

5 Sample Input-Output

5.1 Input

n	2
x_l	5
x_u	10
$maxitr$	25
ϵ_a	.003
x_t	6.405
$coefficients(x_0, x_1, x_2)$	$4.5, 2.5, -0.5$

5.2 Output

Click Here

6 Important Notes

- Implement using Python programming language
- Be careful about floating point arithmetic
- Be careful in maintaining order of coefficients

7 Marks Distribution

- Bisection Method: 6
- False Position Method: 6
- Output: 2
- Submission: 1

8 Rules

- You have to submit your code (only .py file) through the submission link provided in the site. The file name will be in the following format:

  <Your_10_Digit_Student_ID>.py

  For example, the submitted file name would look like 2016-2-60-108.py if it is submitted by a student having 2016-2-60-108 as student id.

- Any type of plagiarism is strongly forbidden. **No** marks will be given to the students who will be found to be involved in plagiarism (from internet/senior/class- mates code etc.). It does not matter who is the server and who is the client.

9 Deadline

Deadline is set at **24 September, 2019 8:00 am**