IMPLEMENTATION OF REGULA FALSI METHOD IN PYTHON

SUBMITTED BY: UMANG KANCHAN

SUBMITTED TO: Dr. AYESHA CHOUDHARY

ASSIGNMENT 1

NUMERICAL METHODS (CS-406)

2023

# Assignment 1

# Subject: Numerical Methods

# Topic: Regula Falsi implementation using python.

# Submitted By: UMANG KANCHAN (MCA sem-1).

#\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Program starts\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#  importing sympy

from sympy import \*

# taking function input from user

inp=input("Enter an equation:\n")

function=sympify(inp)

def f(*n*):

    return float(function.subs('x',*n*))

# taking maximum tolerance from user

Tol\_Max=float(input("\nEnter the maximum tolerance\n"))

# Regula falsi function

def regulaFalsi(*a*,*b*):

    s=*a*

    e=*b*

    if f(*b*)==f(*a*):

*a*=*a*+1

        s=*a*

    print(f"Interval Found {s,e}:\n")

    root=(*a*\*f(*b*)-*b*\*f(*a*))/float((f(*b*)-f(*a*)))

    temp=root

    condition=True

    while condition:

        if f(root)==0:

            break

        elif f(root)\*f(*b*)<0:

*a*=root

        else:

*b*=root

        # print(f"The intermediate root of {inp} in the interval {s,e} is {round(root,6)}")

        root=(*a*\*f(*b*)-*b*\*f(*a*))/float((f(*b*)-f(*a*)))

        condition = (abs(temp-root)>=Tol\_Max)

        temp=root

    print(f"The root of {inp} in the interval {s,e} is {round(root,6)}.\n")

# function for finding the interval.

def rangeN():

    a=0

    b=0

    i=-10

    isTrue=False

    while(i<10):

        if("log" in inp and i<=0):

            i=i+1

            continue

        if(f(i)\*f(i+1)<0):

            a=i

            b=i+1

            isTrue=True

            regulaFalsi(a,b)

        elif(f(i)==0):

            isTrue=True

            print(f"The root of equation in {i,i+1} is",i)

        i=i+1

    if(not isTrue):

            print("No interval found such that f(a)\*f(b)<0\n")

def findRoot():

        rangeN()

findRoot()

#\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Program ends\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**TEST CASE 1:**

Enter an equation:

x\*\*3-3\*x+1

Enter the maximum tolerance

0.0005

Interval Found (-2, -1):

The root of x\*\*3-3\*x+1 in the interval (-2, -1) is -1.879378.

Interval Found (0, 1):

The root of x\*\*3-3\*x+1 in the interval (0, 1) is 0.347306.

Interval Found (1, 2):

The root of x\*\*3-3\*x+1 in the interval (1, 2) is 1.531956.

**TEST CASE 2:**

Enter an equation:

2\*exp(x)\*sin(x)-3

Enter the maximum tolerance

0.0005

Interval Found (0, 1):

The root of 2\*exp(x)\*sin(x)-3 in the interval (0, 1) is 0.768842.

Interval Found (3, 4):

The root of 2\*exp(x)\*sin(x)-3 in the interval (3, 4) is 3.071592.

Interval Found (6, 7):

The root of 2\*exp(x)\*sin(x)-3 in the interval (6, 7) is 6.285612.

Interval Found (9, 10):

The root of 2\*exp(x)\*sin(x)-3 in the interval (9, 10) is 9.424481.