2023

ASSIGNMENT 1

NUMERICAL METHODS (CS-406)

IMPLEMENTATION OF REGULA FALSI METHOD IN PYTHON

SUBMITTED BY: UMANG KANCHAN
SUBMITTED TO: DR. AYESHA CHOUDHARY

```
# 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.