**Lab Task 4**

**Numerical Computing Lab(105127)**

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Q1:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S#** | **Functions** | **Starting Interval** | **Tolerance** | **No. Of Iterations** | **Root** |
| 1 | Cos(x)-1.3x = 0 | 0.0001 - 3 | 0.01 | 33 | -0.6065041389894785 |
| 0.0001 - 3 | 0.001 | 46 | -0.2948060703212334 |
| 0.0001 - 3 | 0.0001 | 47 | -0.2948060703212334 |
| 2 | xCos(x)-2x2+3x-1=0 | 1 - 3 | 0.01 | 3 | 1.12211321879297 |
| 1 - 3 | 0.001 | 3 | 1.12211321879297 |
| 1 - 3 | 0.0001 | 3 | 1.12211321879297 |
| 3 | 2xCos(2x)-(x+1)2=0 | -3 - 4 | 0.01 | 9 | -0.7055381921810417 |
| -3 - 4 | 0.001 | 11 | -0.6954213829874407 |
| -3 - 4 | 0.0001 | 11 | -0.6954213829874407 |

Q2:

def f(x):

return x\*\*3-0.165\*x\*\*2+0.0003993

var1=0

var2=0

var3=0

iter1=0

iter2=0

iter3=0

met1=''

met2=''

met3=''

a = float(input("Enter value for a:"))

b = float(input("Enter value for b:"))

t = float(input("Enter tolerance:"))

def bissection(a,b,tol):

niter=0

while(abs(a-b)>=tol):

mid=(a+b)/2.0

prod1=f(a)\*f(mid)

prod2=f(b)\*f(mid)

if prod1<0:

b=mid

elif prod2<0:

a=mid

niter+=1

return mid,niter

def rf(a,b,tol):

niter=0

while(abs(a-b)>=tol and niter <= 5):

m=(a\*f(b)-b\*f(a))/(f(b)-f(a))

prod1=f(a)\*f(m)

prod2=f(b)\*f(m)

if prod1<0:

b=m

elif prod2<0:

a=m

niter+=1

return m,niter

def secant(fn,a,b,tol=0.001,niter=100):

for i in range(niter):

c= b-(b-a)/(fn(b)-fn(a))\*fn(b)

if abs(c-b)<tol: break

else:

a,b=b,c

else:

print("Max Iteration Completed")

return c,i

var1,iter1=bissection(a,b,t)

met1="Bisection"

tes2,tesb=rf(a,b,t)

if tes2<var1:

var2=var1

iter2=iter1

met2=met1

var1=tes2

iter1=tesb

met1="Regular Falsi"

else:

var2=tes2

iter2=tesb

met2="Regular Falsi"

tes3,tesc=secant(f,a,b,t)

if tes3<var1:

print("1. Secant",tes3,tesc)

print("2.",met1,var1,iter1)

print("3.",met2,var2,iter2)

elif tes3>var1 and tes3<var2:

print("1.",met1,var1,iter1)

print("2. Secant",tes3,tesc)

print("3.",met2,var2,iter2)

else:

print("1.",met1,var1,iter1)

print("2.",met2,var2,iter2)

print("3. Secant",tes3,tesc)

