ESO208

Programming Assignment 1

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Group: J4

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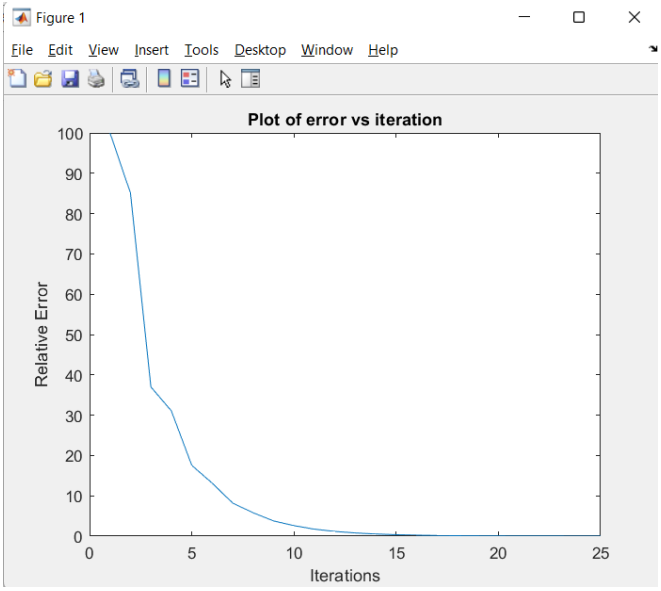
1) Fixed Point Method

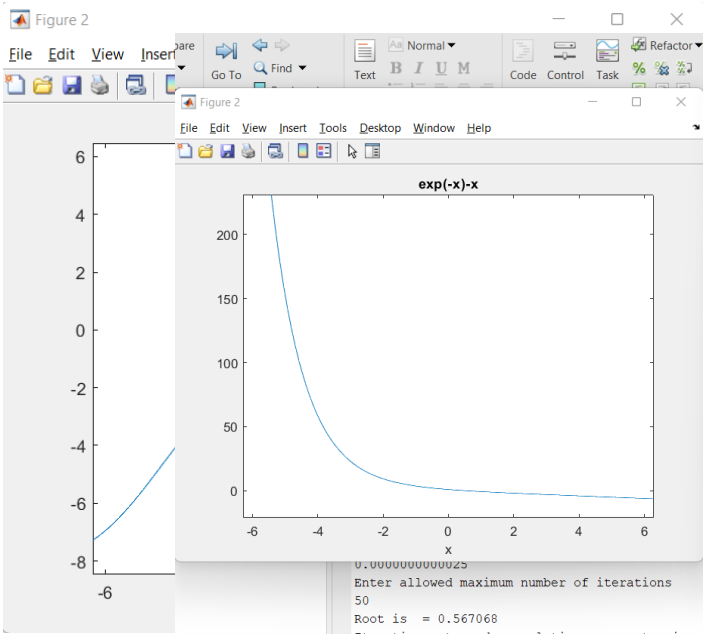
i) $f(x) = x - \cos x$ by fixed point method

Choose the method of solution by selecting letter shown with method:
Bisection-a,
False Position-b,
Fixed Point Method-c,
Newton-Raphson-d,
Secant-e
c
Enter the function
x-cos(x)
Enter your function g(x) such that your function f(x) is expressed as x=g(x)
cos(x)
Enter starting point
0
Now subsequent enter stopping criteria:\n
Enter the relative error allowed in solution
0.01
Enter Convergence criteria for the function value, i.e., how close f(x) is to zero
0.0000000000025
Enter allowed maximum number of iterations
50
Root is = 0.739106
Iterations stopped as relative error stopping criteria was met.

Plot of Relative approx. Error and Iterations



Plot of Given Function



ii) $\boldsymbol{f(x) = exp(-x) - x = 0}$ **by fixed point method**

exp(-x)-x

Enter your function g(x) such that your function f(x) is expressed as x=g(x)

exp(-x)

Enter starting point

0

Now subsequent enter stopping criteria:\n

Enter the relative error allowed in solution

0.05

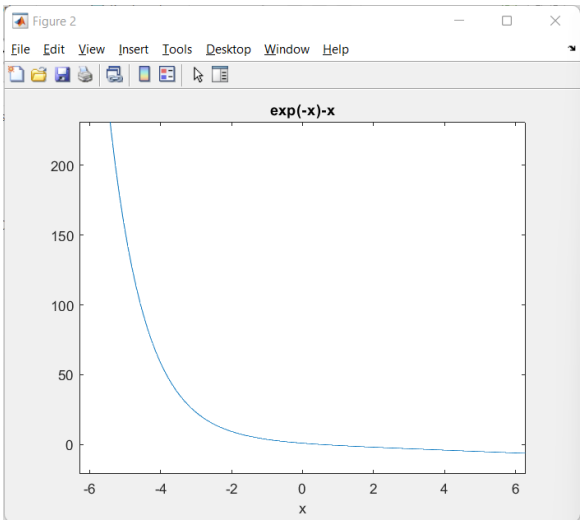
Enter allowed maximum number of iterations

50

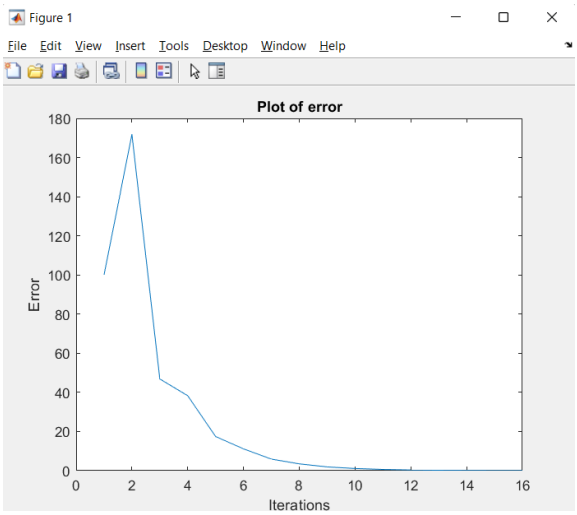
Root is = 0.567068

Iterations stopped as relative error stopping criteria was met

Plot of Given Function



Plot of Relative approx. Error and Iterations



2) $f(x) = x^4 - 7.4x^3 + 20.44x^2 - 24.184x + 9.6448 = 0$ by muller method

For (1,0,-1)

Choose One of the following methods: Muller-a, Bairstow-b

a

Input Degree of Polynomial

4

Enter all degree+1 number of coefficients with each input followed by space

9.6448 -24.184 20.44 -7.4 1

Enter first starting point

-1

Enter 2nd starting point

0

Enter third starting point

1

Now subsequent enter stopping criteria:

Enter the relative error allowed in solution

0.01

Enter Convergence criteria for the function value, i.e., how close f(x) is to zero

0.0000000000025

Enter allowed maximum number of iterations

50

Root is 0.800019+0.000000i

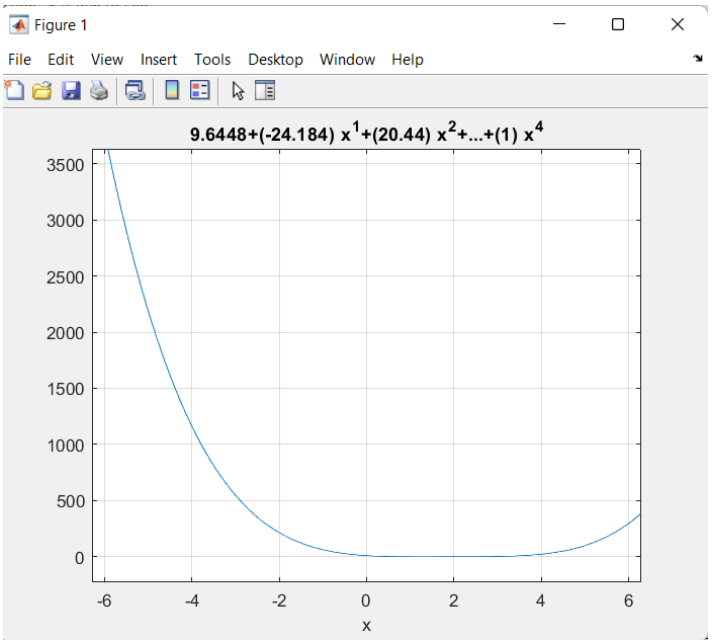
Iterations stopped as relative error stopping criteria was met

For (0,1,2) Root is the same 0.800019+0.000000i

Similarly, the we can get roots of the Non-linear Equations by using choosing one method of the five in command window

a) Bisection b) False-position c) Fixed-Point d) Newton-Raphson e) Secant

Plot of Function



$f(x) = x^4 - 7.4x^3 + 20.44x^2 - 24.184x + 9.6448 = 0$ by Bairstow method

Choose One of the following methods: Muller-a, Bairstow-b

b

*Input your polynomial: x^4-7.4*x^3+20.44*x^2-24.184*x+9.6448*

Starting value of r: -5

Starting value of s: 4

Allowed Value of relative error: 0.01

Allowed maximum iteration: 50

Roots of the functions are: 2.200000, 0.800000

Roots of the functions are: 2.200000 + 0.800000i, 2.200000 - 0.800000i

For (-5,4)	*Roots of the functions are: 2.200000 + 0.800000i, 2.200000 - 0.800000i*
For (-2,2)	*Roots of the functions are: 2.199954 + 0.800004i, 2.199954 - 0.800004i*

Plot of Function