Programming Assignment 1

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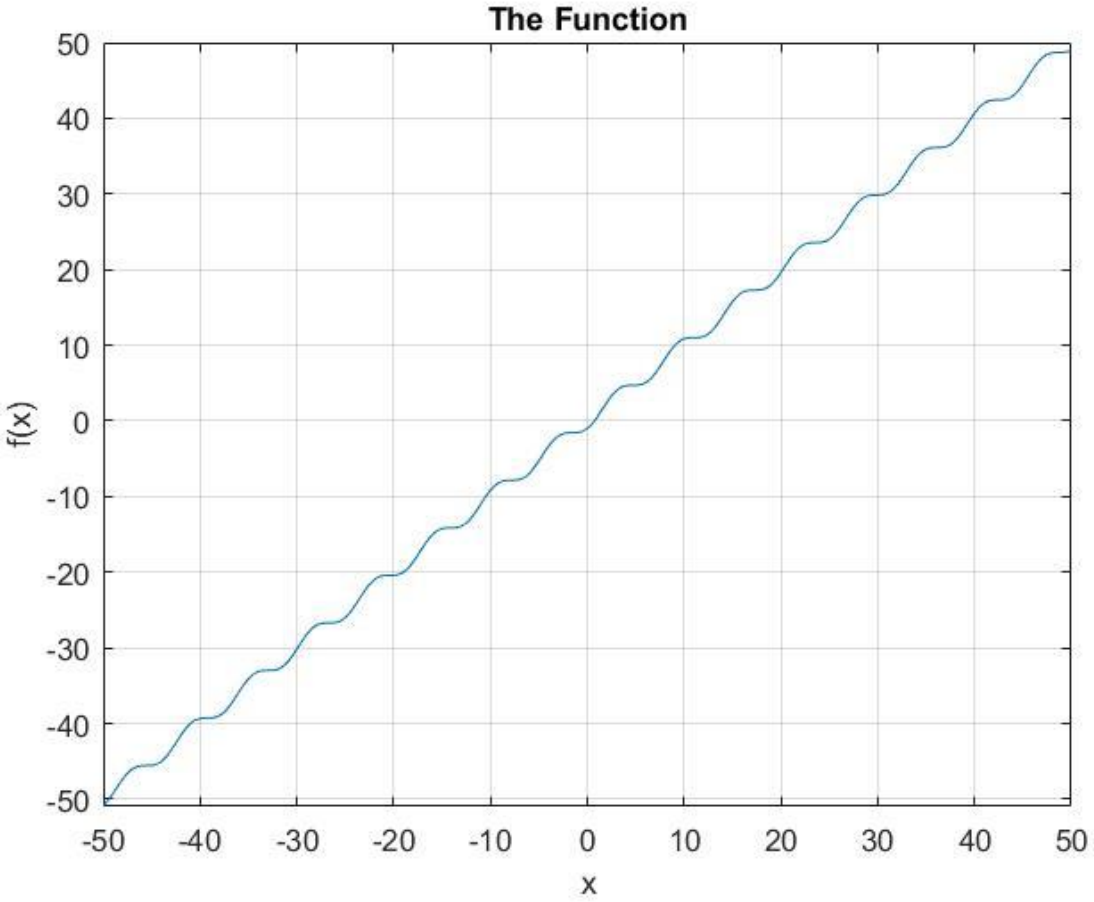
Note1: Point 1, Point2 are initial points.

Note2: r and s are initial guess of coefficient of quadratic equation x^2-s*x-r;

Sample function 1: x-cos(x)

Function Plot:



1: Bisection

Point 1=0

Point 2=1

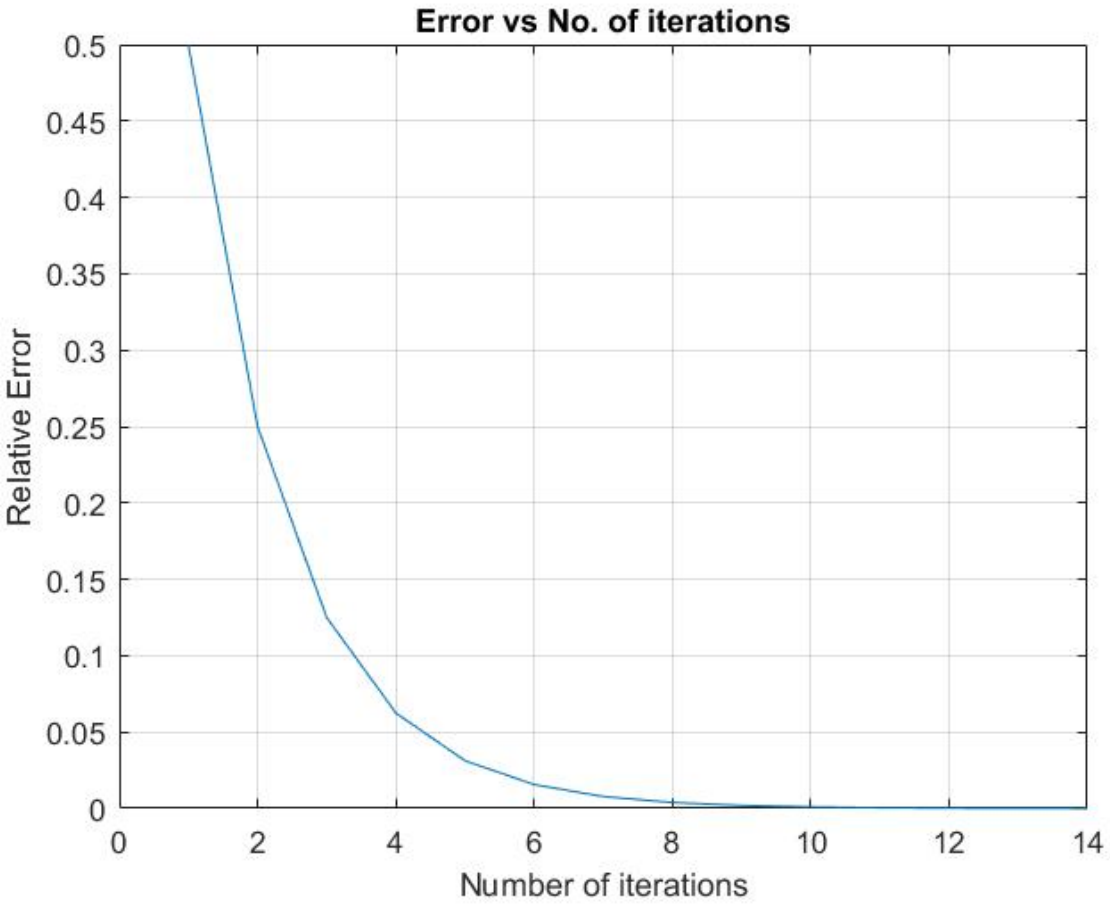
Max number of iterations=50;

Criterion for Relative Error=0.0001

Criterion for closeness of function=0.00001

Root=0.739075

flag: Termination due to convergence of interval



2: False Position

Point 1=0

Point 2=1

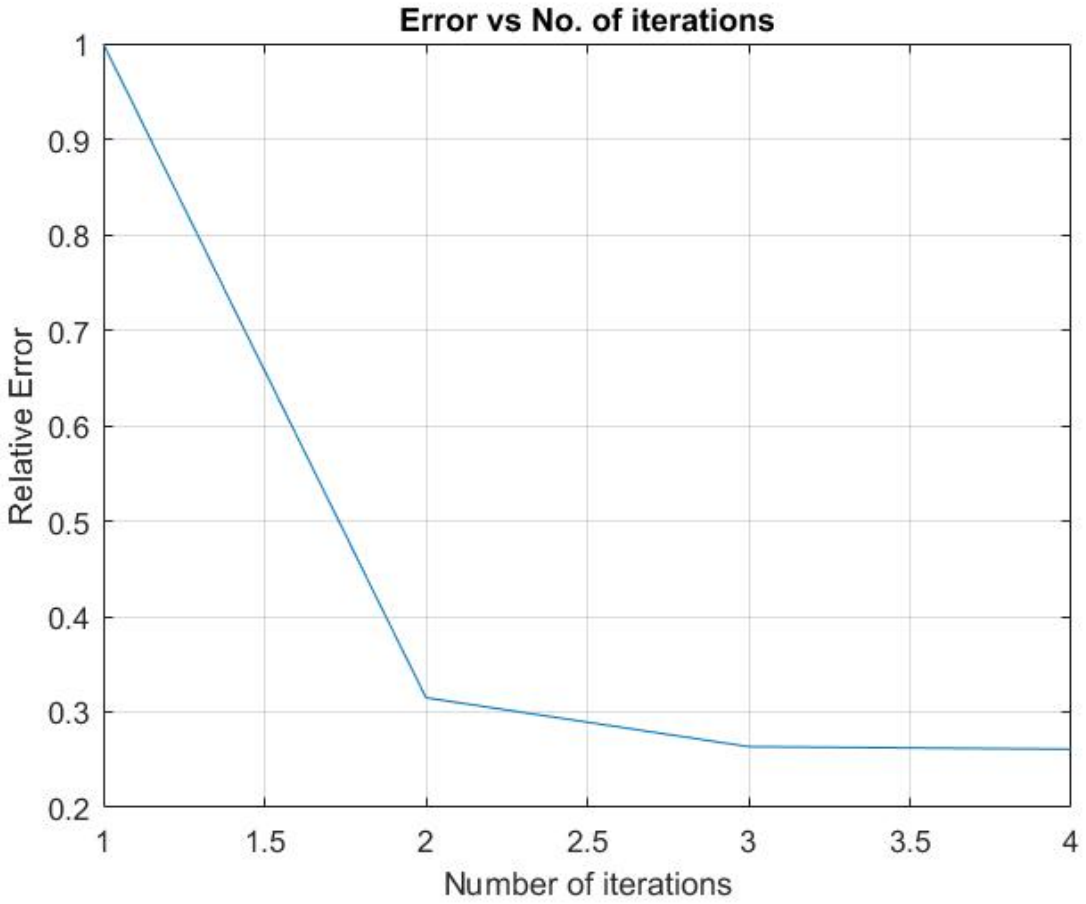
Max number of iterations=50;

Criterion for Relative Error=0.0001

Criterion for closeness of function=0.00001

Root=0.739085

Flag=Termination due to convergence of function value



3: Fixed Point

g(x) = cos(x)

Point 1=0

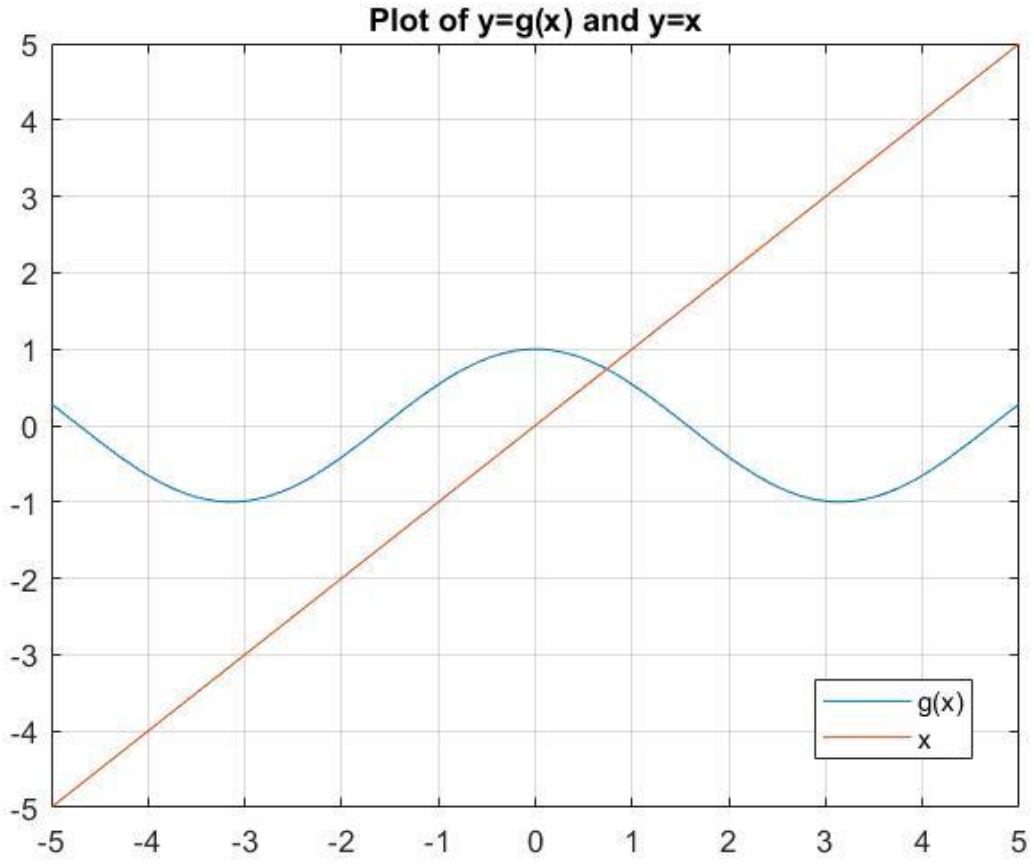
Max number of iterations=50;

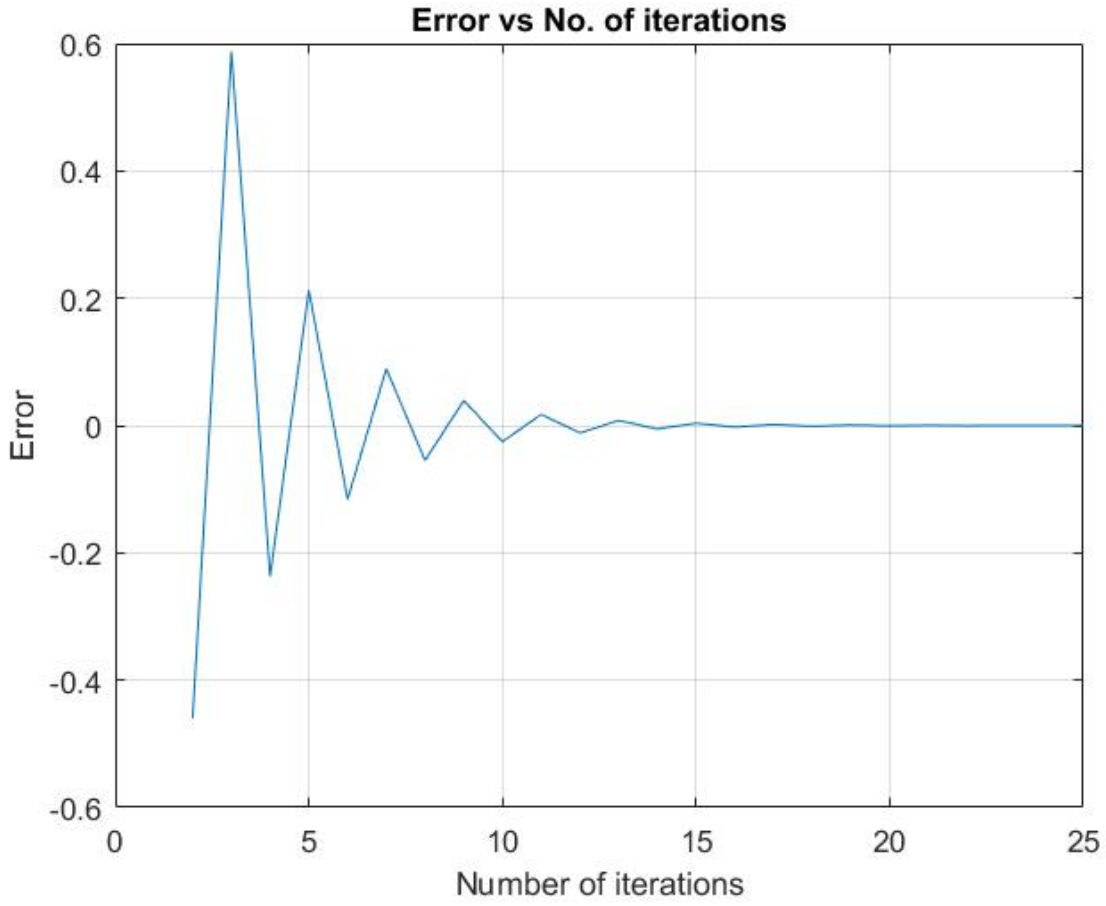
Criterion for Relative Error=0.0001

Criterion for closeness of function=0.00001

Root=0.739106

Flag=Termination due to convergence in relative approximate error





: **Relative error vs Number of iterations graph**

4: Newton Raphson

Point 1=0

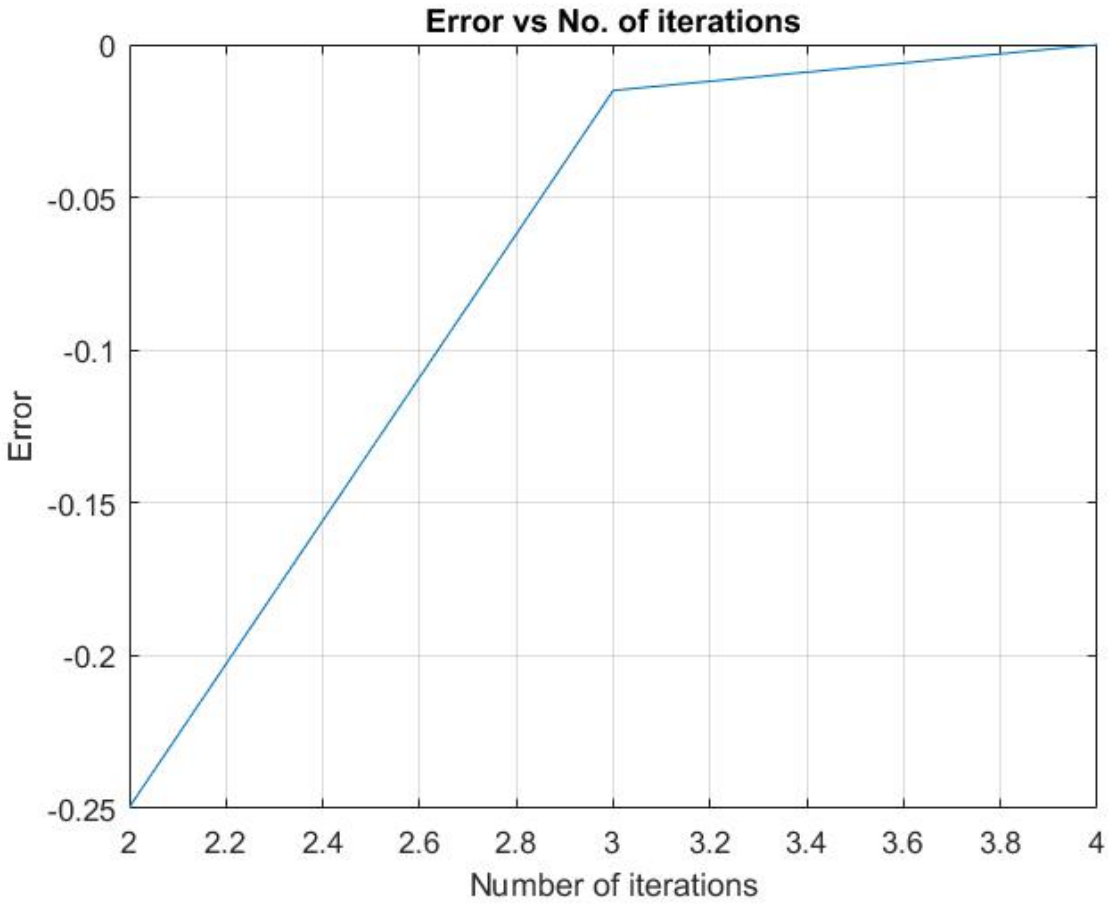
Max number of iterations=50;

Criterion for Relative Error=0.0001

Criterion for closeness of function=0.00001

Root=0.739085

Flag=Termination due to convergence of relative approximate error



Relative error vs Number of iterations graph

5: Secant Method

Point 1=0

Point 2=1

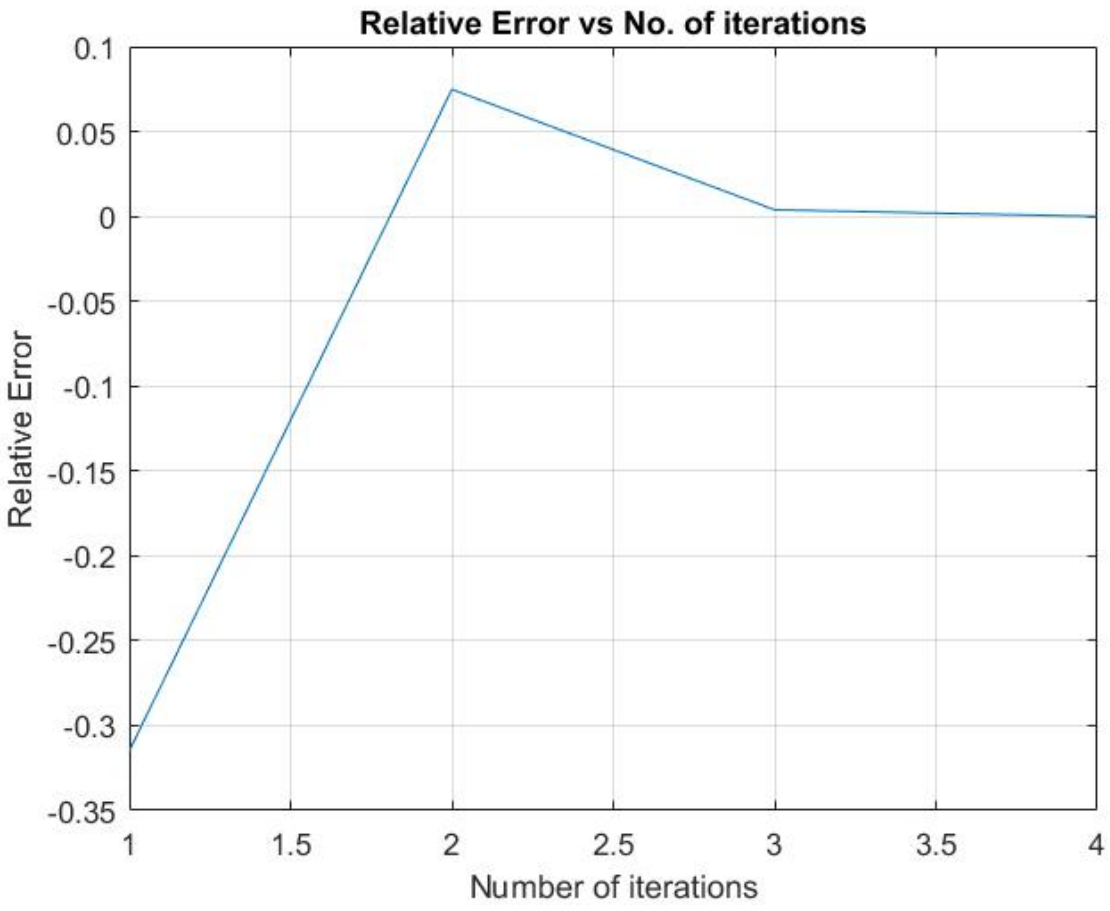
Max number of iterations=50;

Criterion for Relative Error=0.0001

Criterion for closeness of function=0.00001

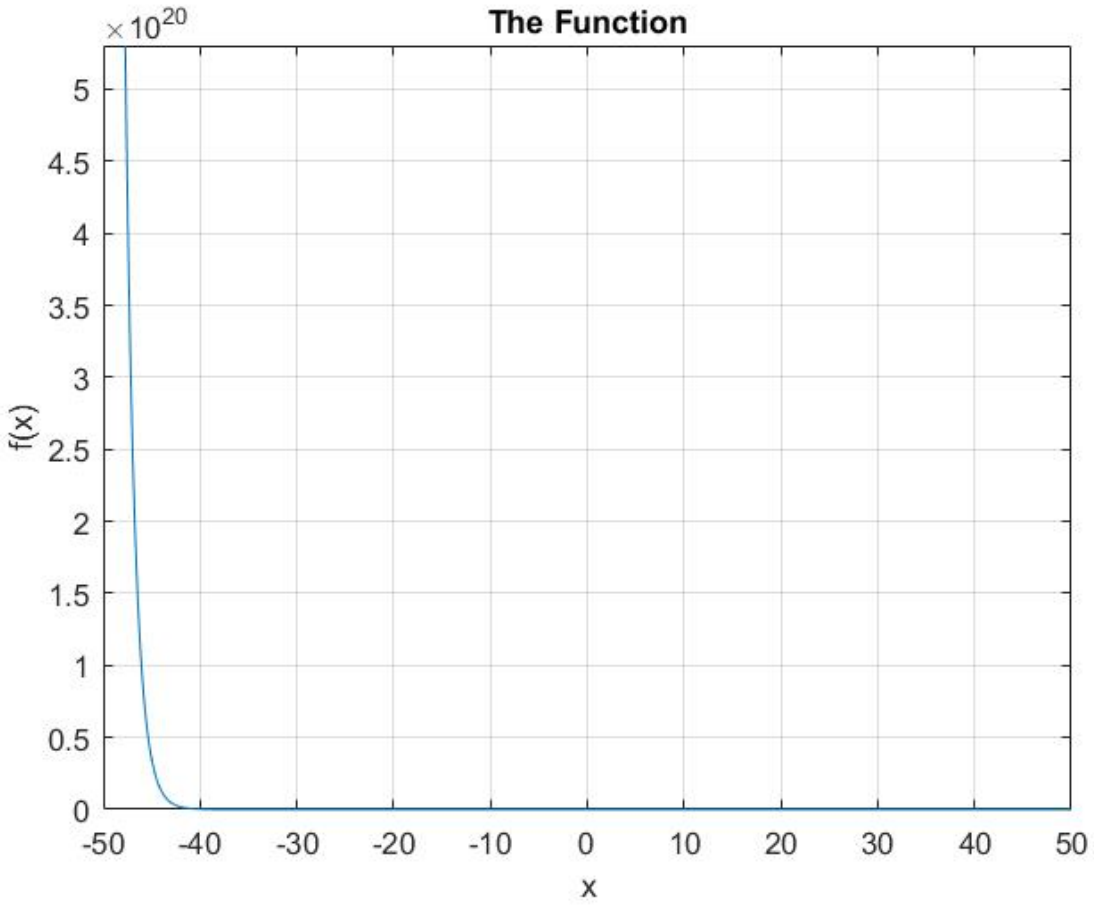
Root= 0.739085

Flag= Termination due to convergence of function value



Sample Function 2: exp(-x)-x

Function Plot:



1: Bisection

Point 1=0

Point 2=1

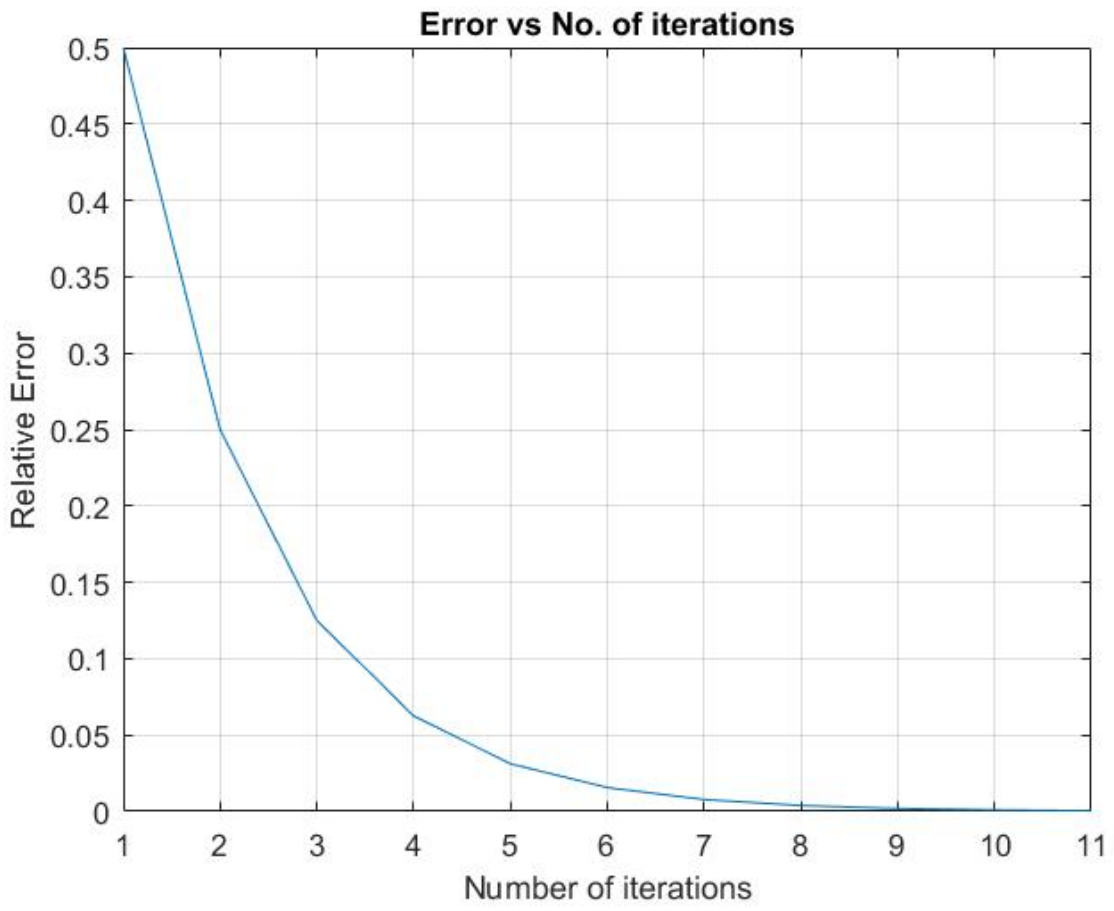
Max number of iterations=50;

Criterion for Relative Error=0.0005

Criterion for closeness of function=0.00001

Root= 0.566895

Flag= Termination due to convergence of interval



2: False Point

Point 1=0

Point 2=1

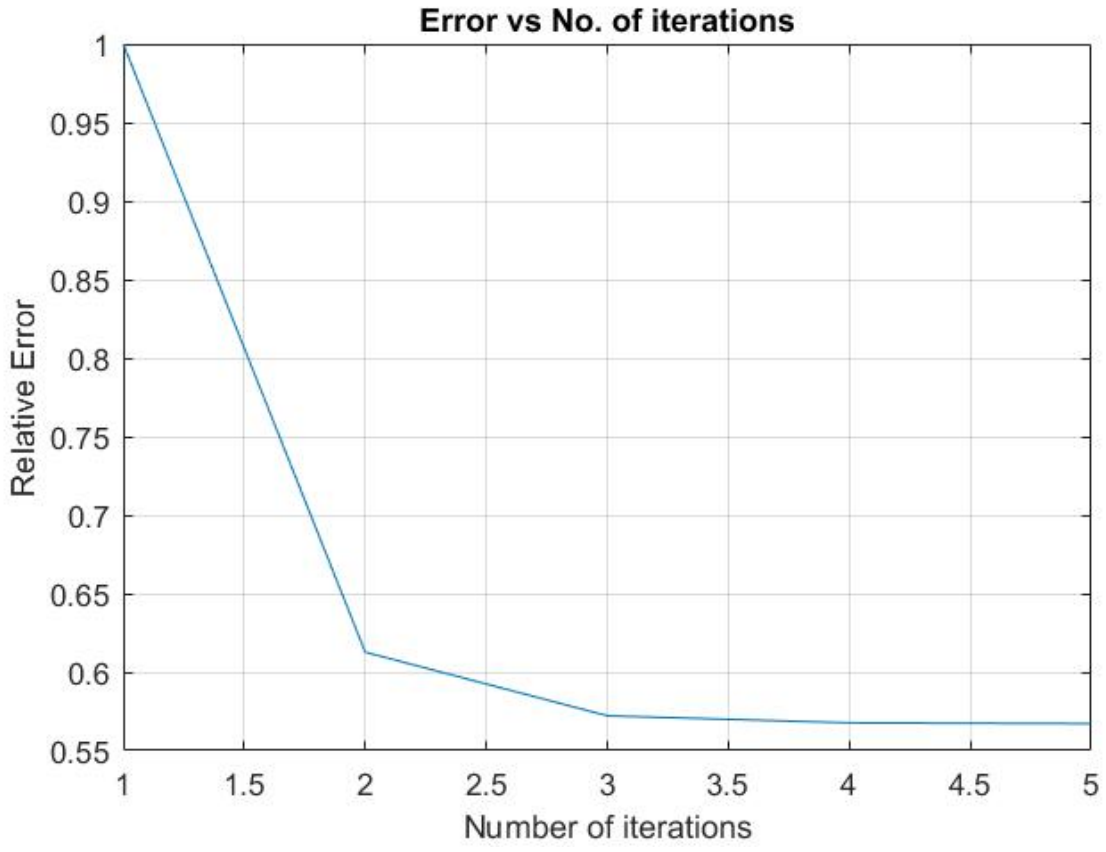
Max number of iterations=50;

Criterion for Relative Error=0.0005

Criterion for closeness of function=0.00001

Root: 0.567144

Flag= Termination due to convergence of function value



3: Fixed Point

g(x) = exp(-x)

Point 1=0

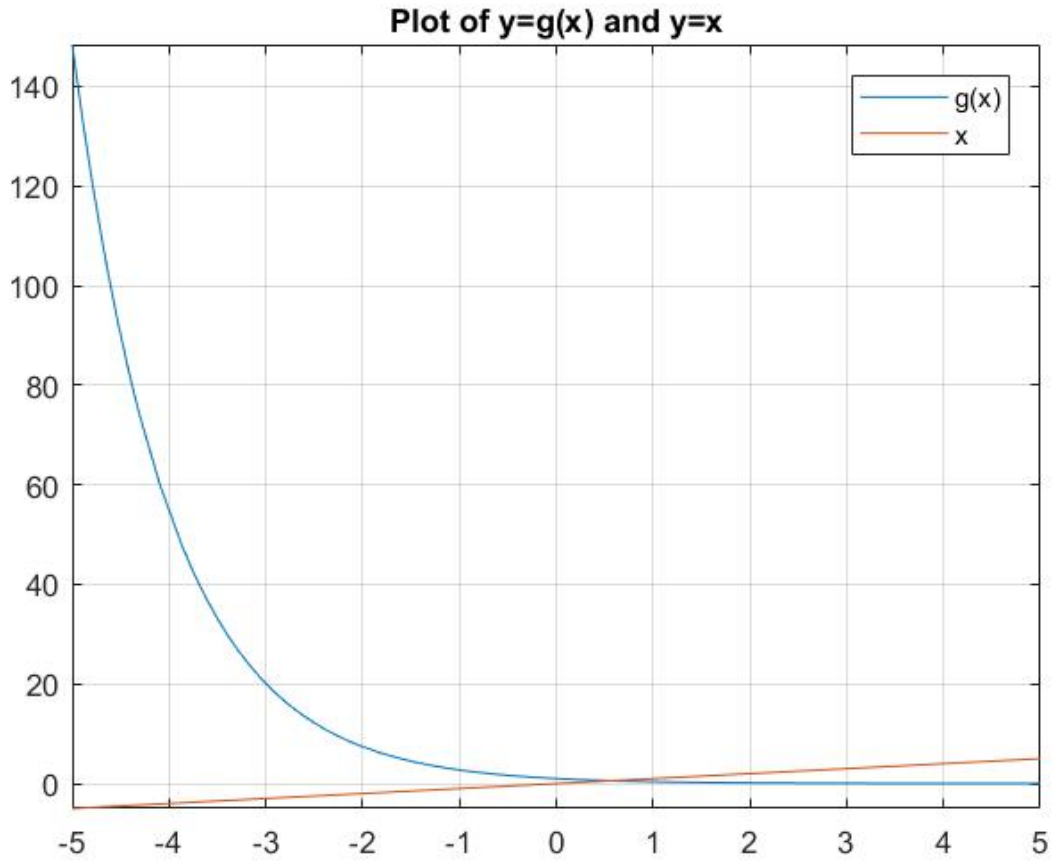
Max number of iterations=50;

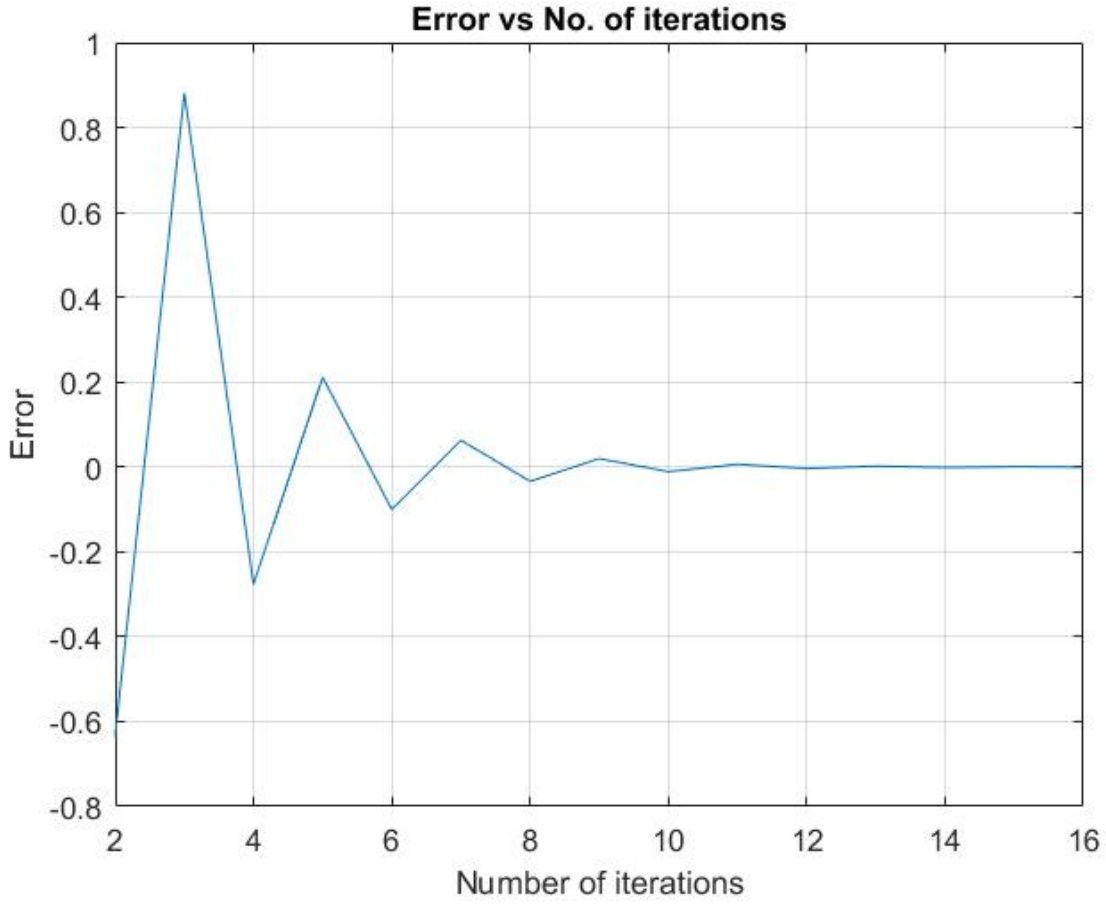
Criterion for Relative Error=0.0005

Criterion for closeness of function=0.00001

Root = 0.567068

Flag = Termination due to convergence in relative approximate error




Error vs No. of iterations
Error
Number of iterations
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
2
4
6
8
10
12
14
16

4: Newton Raphson

Point 1=0

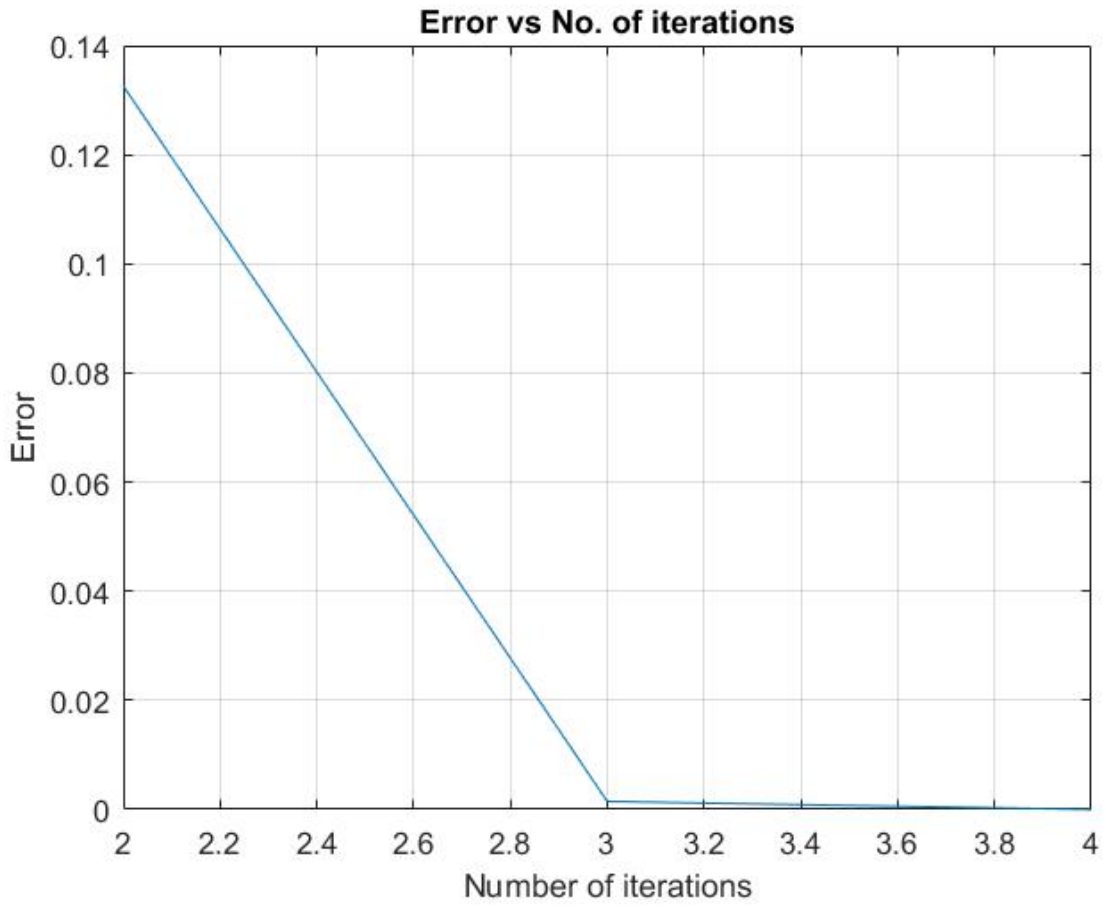
Max number of iterations=50;

Criterion for Relative Error=0.0005

Criterion for closeness of function=0.00001

Root = 0.567143

Flag = Termination due to convergence of function value



5: Secant Method

Point 1=0

Point 2=1

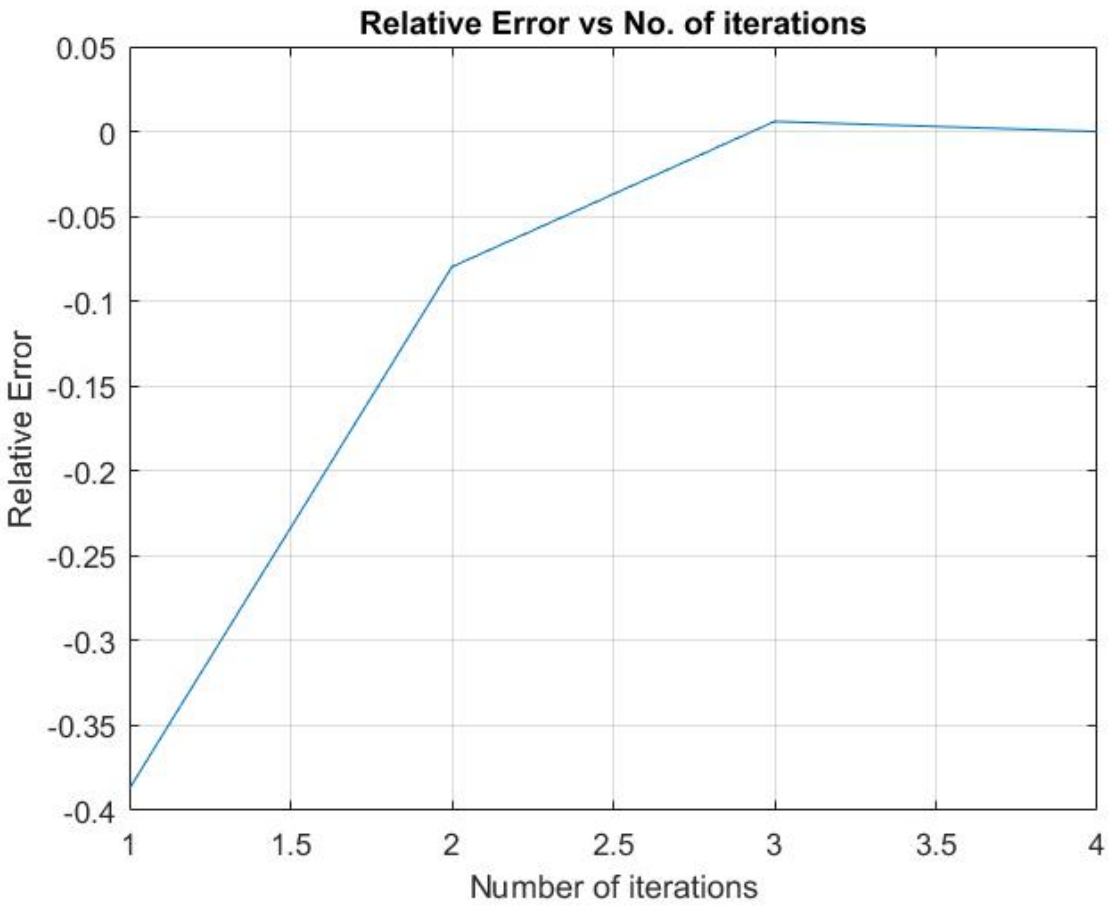
Max number of iterations=50;

Criterion for Relative Error=0.0005

Criterion for closeness of function=0.00001

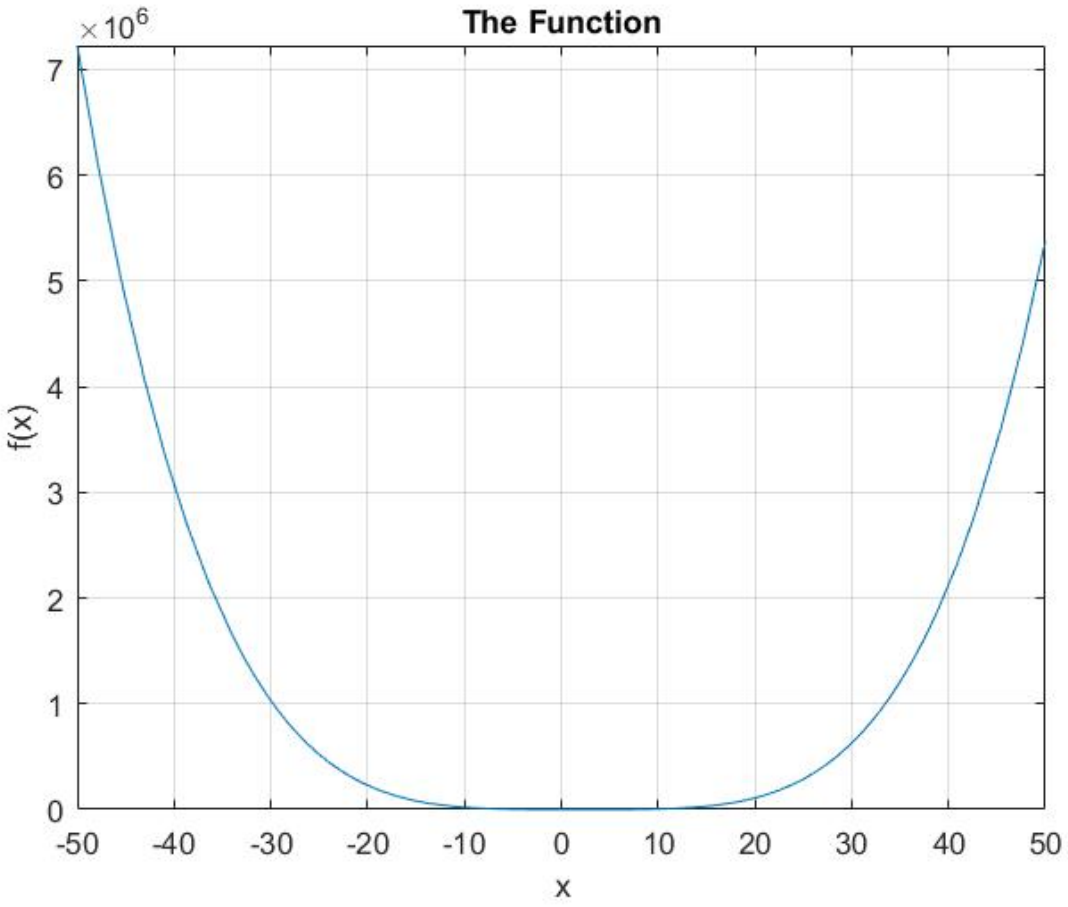
Root = 0.567143

Flag = Termination due to convergence of function value



Sample Function 3: f(x) = x^4 − 7.4x^3 + 20.44x^2 − 24.184x + 9.6448 = 0

Function Plot:



1: Muller Method

Point 1=-1;

Point 2=0;

Point 3=1;

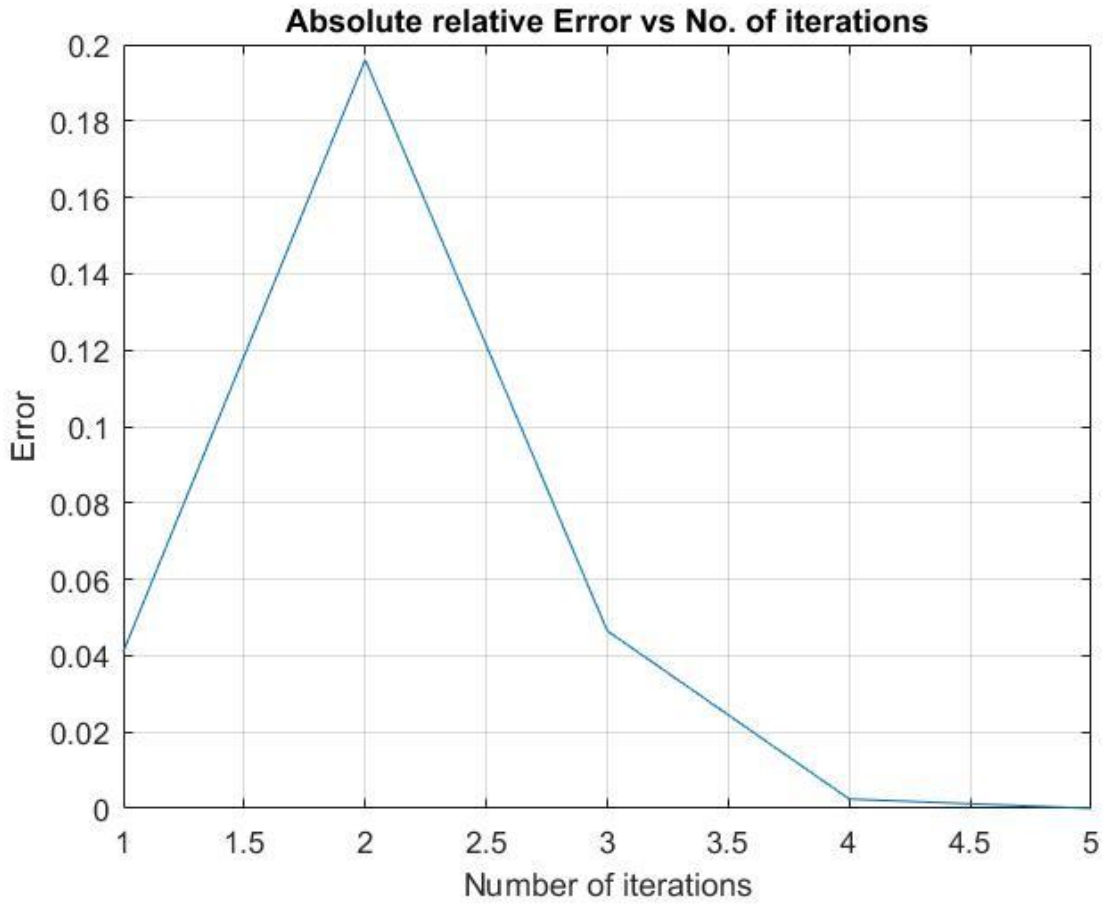
Max number of iterations=50;

Criterion for Relative Error=0.0001

Criterion for closeness of function=0.00001

Root = 0.800000

Flag= Termination due to convergence of relative approximate error



2: Bairstow Method

r=-5

s=4

Max number of iterations=50;

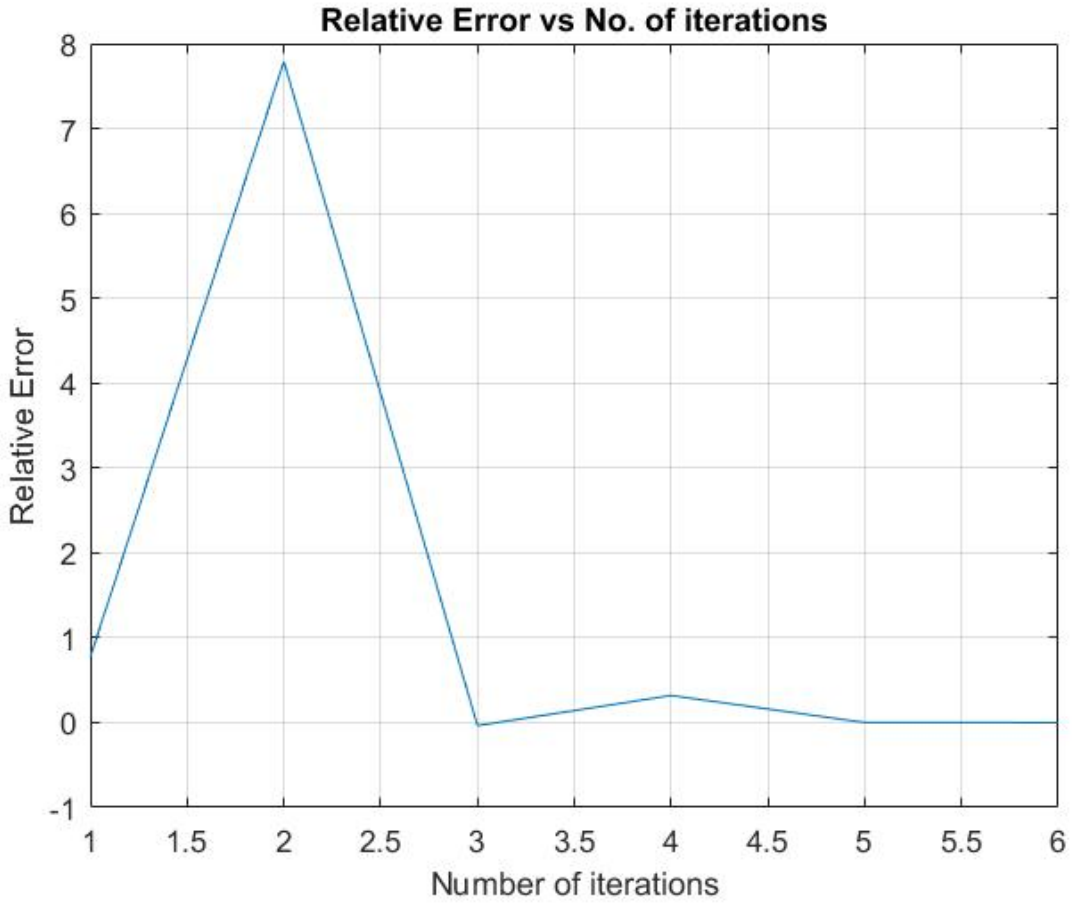
Criterion for Relative Error=0.0001

Criterion for closeness of function=0.00001

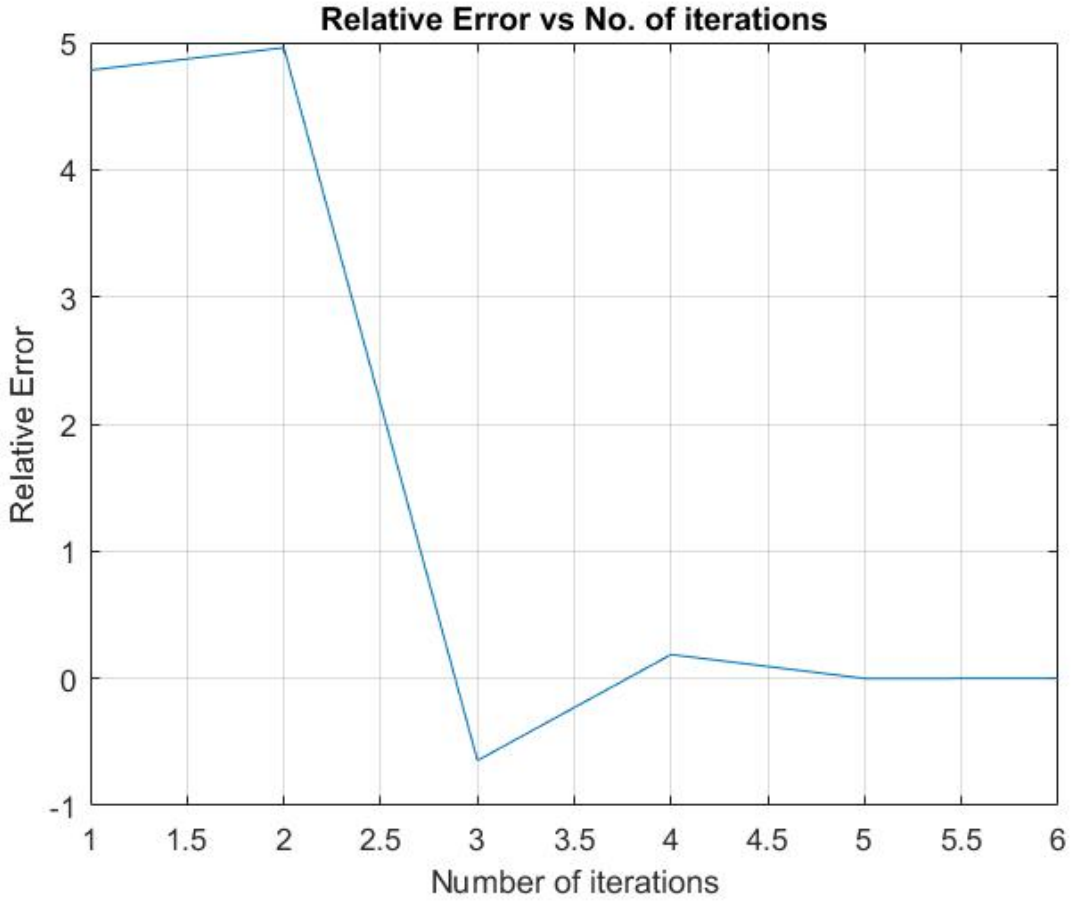
Roots = 2.2000+0.8000i

2.2000-0.8000i

Flag= Termination due to convergence of relative approximate error



Relative Error vs Iteration curve for r



Relative Error vs Iteration curve for s

r=-2;

s=2;

Max number of iterations=50;

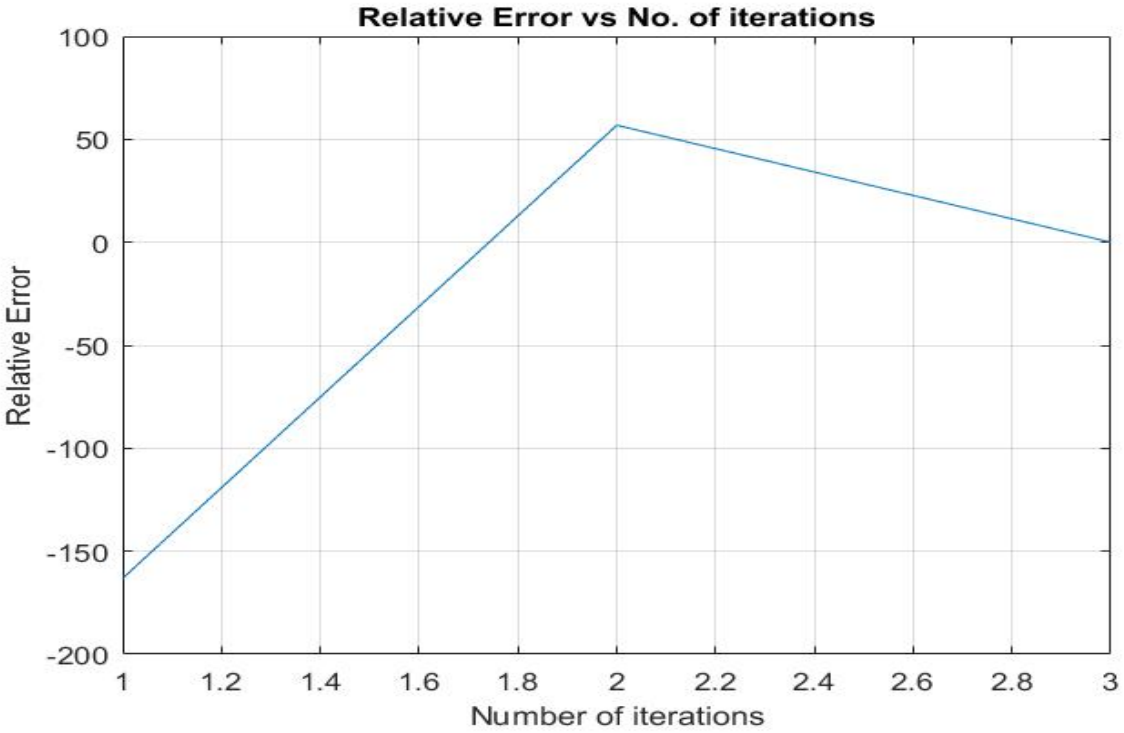
Criterion for Relative Error=0.0001

Criterion for closeness of function=0.00001

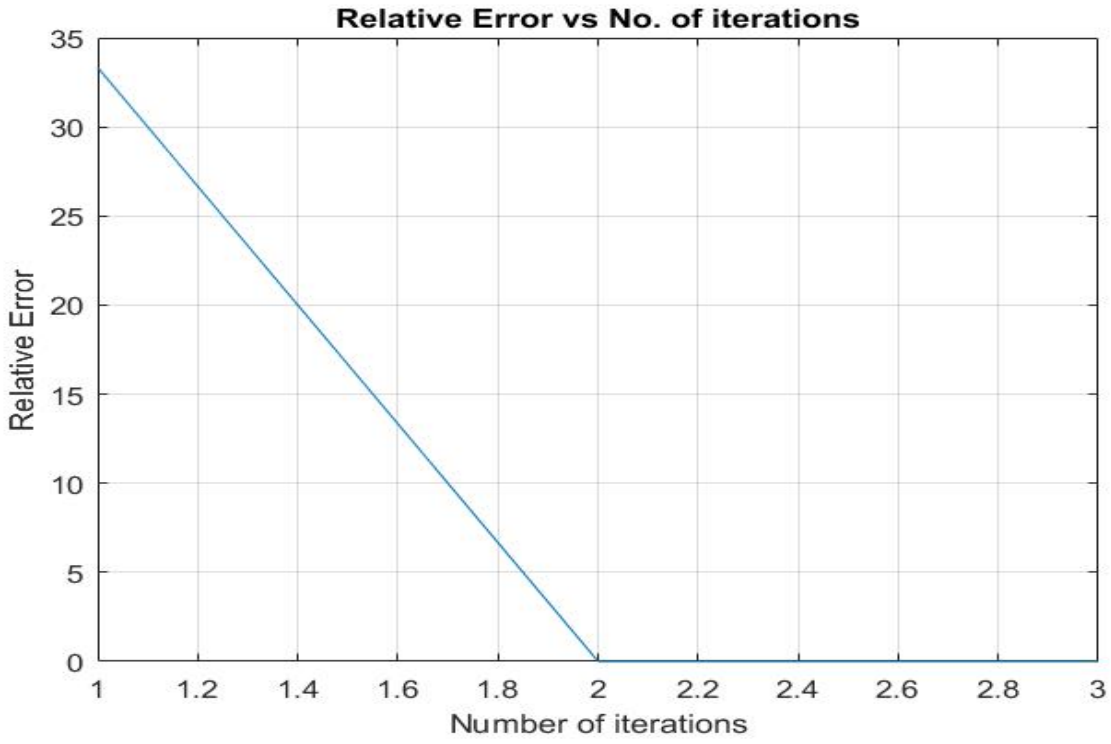
Roots= 2.2000 + 0.8000i 2.2000 - 0.8000i

2.2000 + 0.0000i 0.8000 + 0.0000i

Flag= Termination due to convergence of relative approximate error



Relative Error vs Iteration curve for r



Relative Error vs Iteration curve for s