ASSIGNMENT-1

QUESTION-1

TEST CASE-1 : f(X)= 600*x^4 - 550*x^3 + 200*x^2 - 20*x - 1 = 0

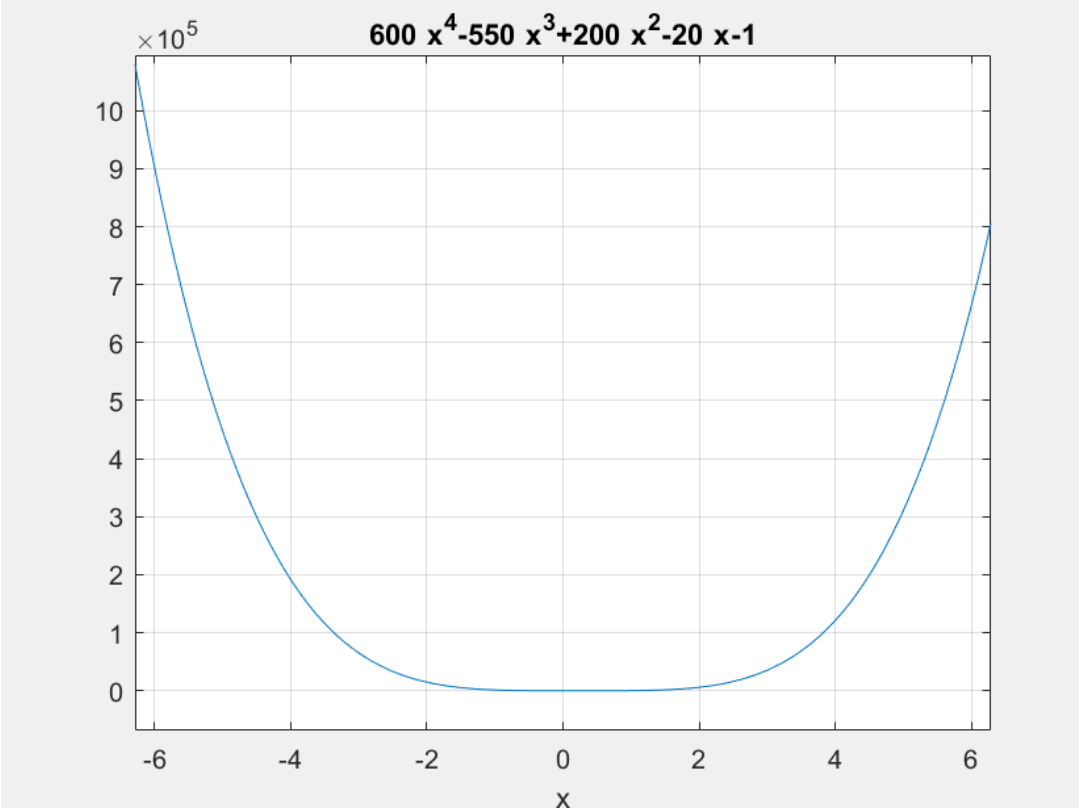
1. **Bisection Method**

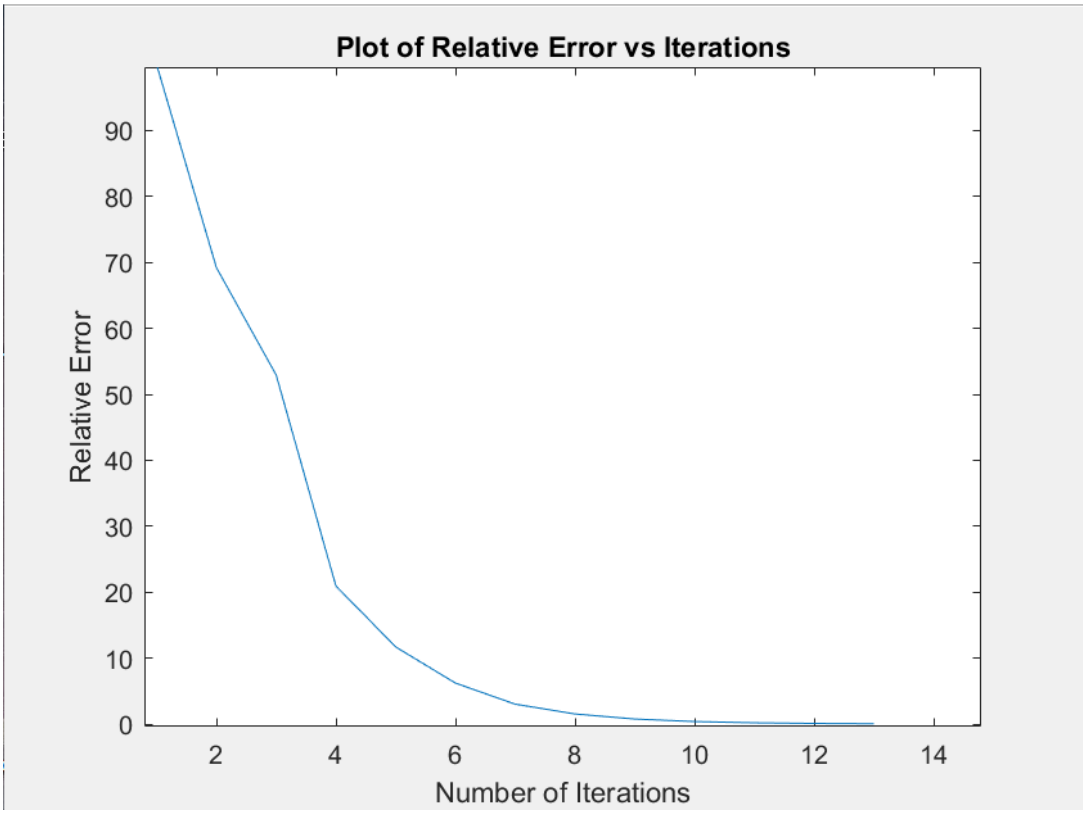
INPUT:

Choose the method of solution by selecting number shown with method:
 Bisection-1,
 False Position-2,
 Modified False Position-3,
 Newton-Raphson-4,
 Secant-5
1
Enter the function f(x)
600*x^4 - 550*x^3 + 200*x^2 - 20*x - 1
Enter the first starting point
0.1
Enter the second starting point
1.0
Enter stopping criteria:
Enter the maximum relative error allowed (in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

The root is: 0.232385


600 x^4-550 x^3+200 x^2-20 x-1
×10^5
10
9
8
7
6
5
4
3
2
1
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
Relative Error
90
80
70
60
50
40
30
20
10
0
2
4
6
8
10
12
14
Number of Iterations

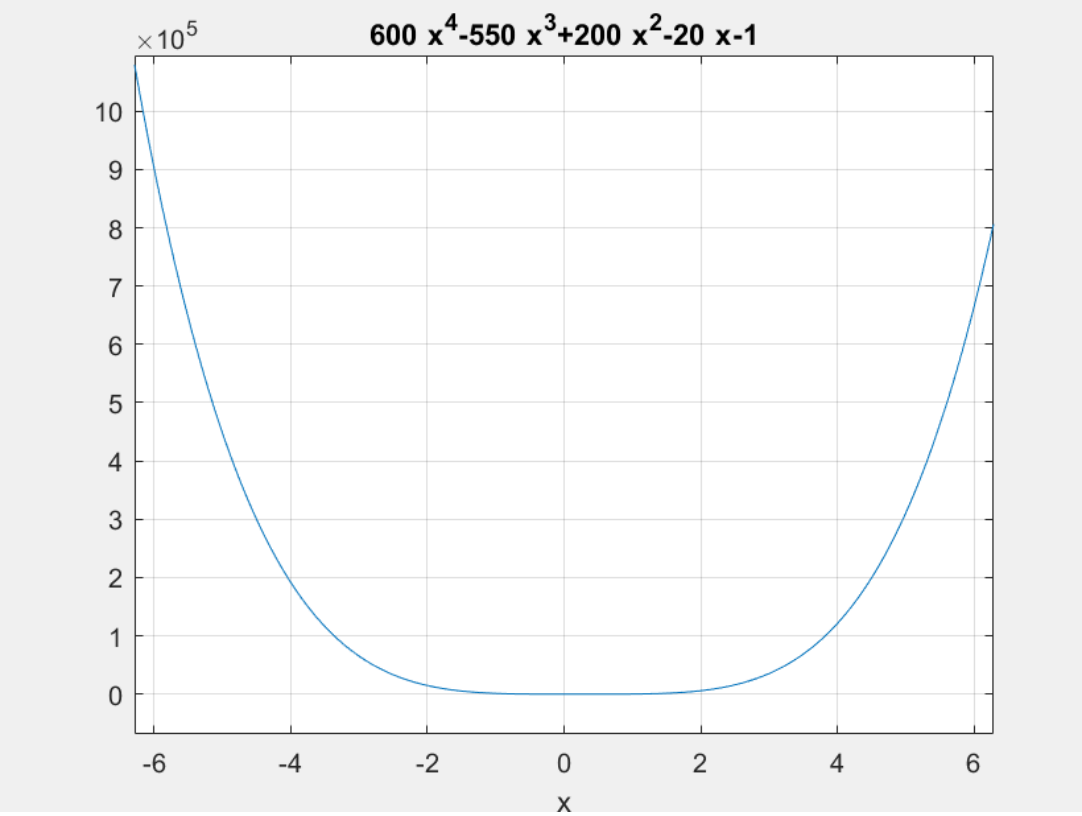
2. False-Position

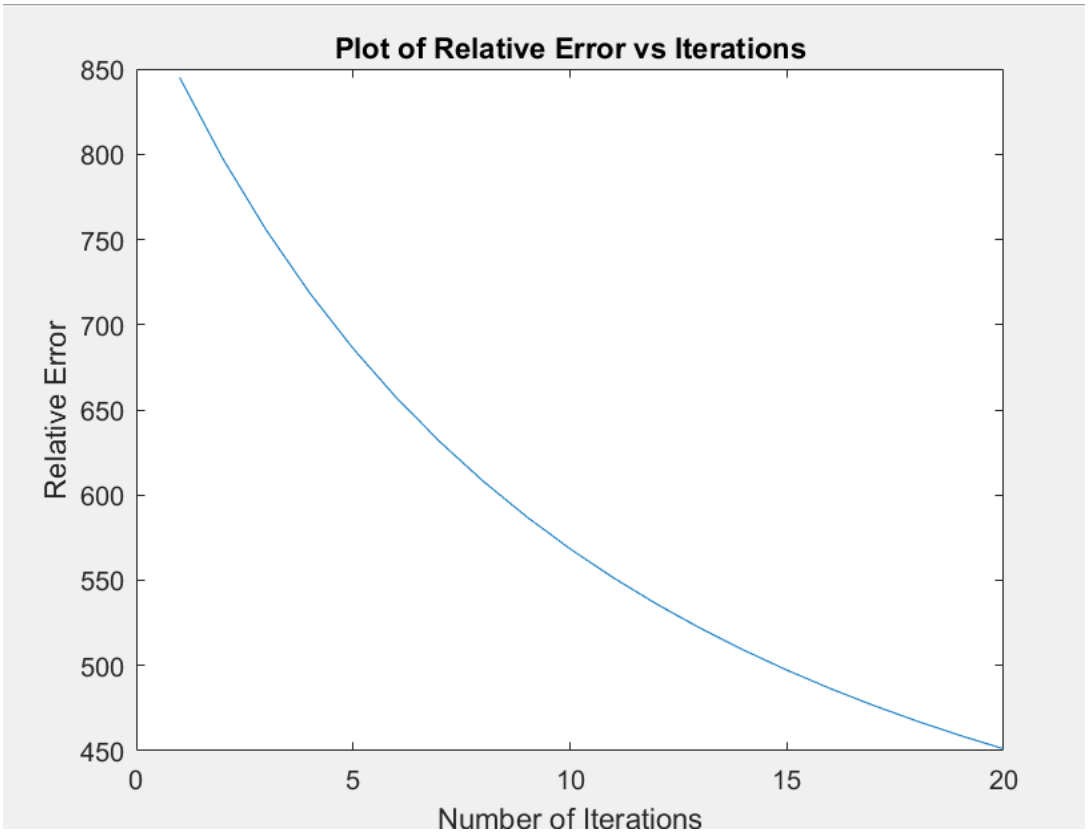
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
2
Enter the function f(x):
600*x^4 - 550*x^3 + 200*x^2 - 20*x - 1
Enter the first starting point
0.1
Enter the second starting point
1.0
Enter stopping criteria:
Enter the maximum relative error allowed(in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

The root is: 0.181460


600 x^4-550 x^3+200 x^2-20 x-1
×10^5
10
9
8
7
6
5
4
3
2
1
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
Relative Error
850
800
750
700
650
600
550
500
450
0
5
10
15
20
Number of Iterations

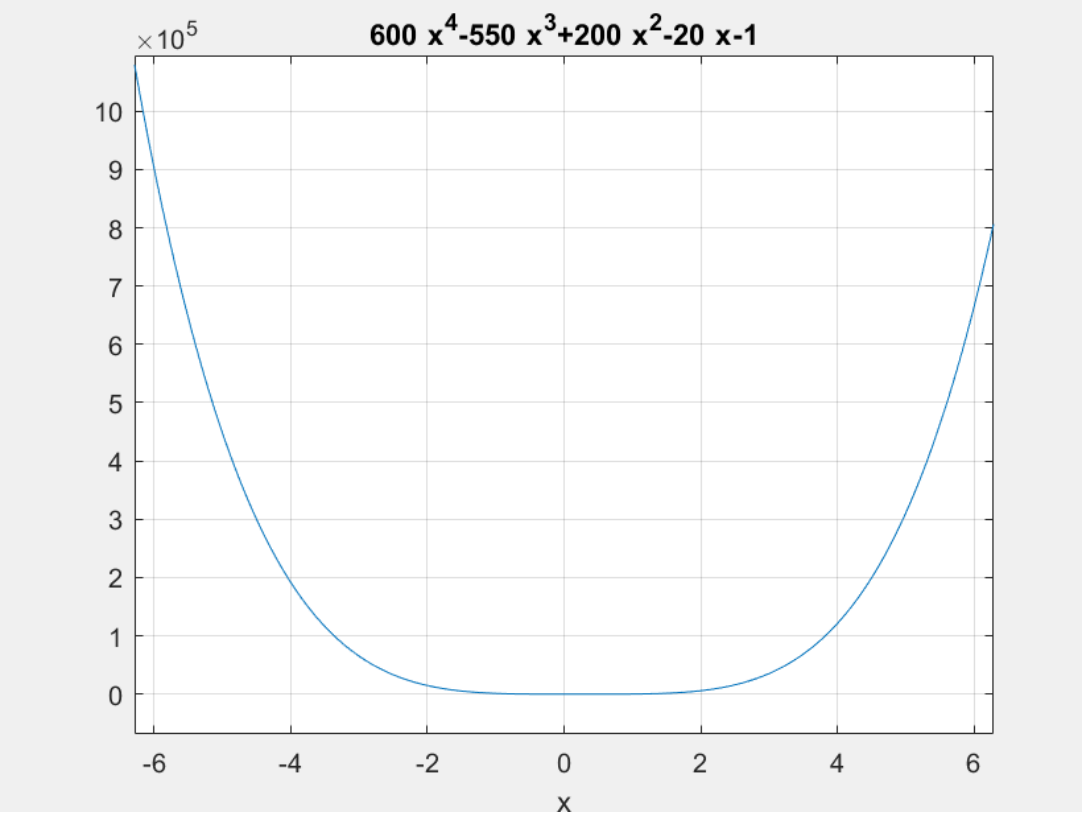
3. **Modified False-Position**

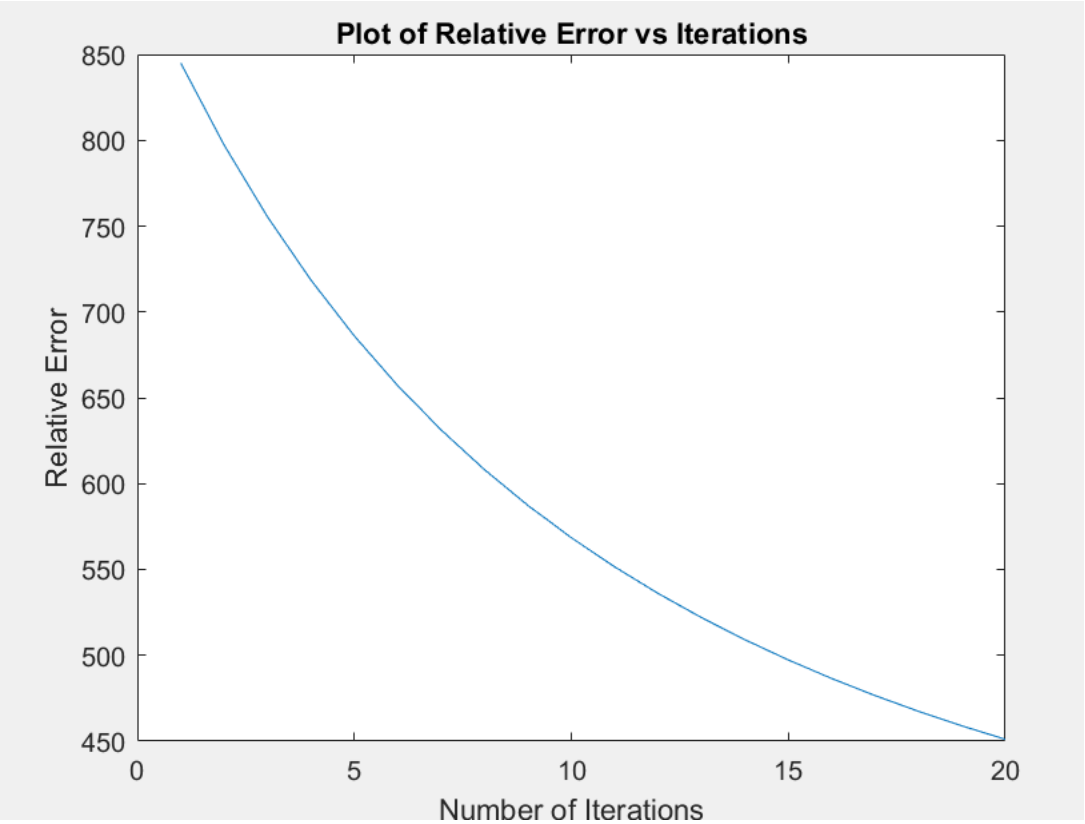
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
3
Enter the function f(x)
600*x^4 - 550*x^3 + 200*x^2 - 20*x - 1
Enter the first starting point
0.1
Enter the second starting point
1.0
Enter stopping criteria:
Enter the maximum relative error allowed (in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

The root is: 0.181460


600 x^4-550 x^3+200 x^2-20 x-1
×10^5
10
9
8
7
6
5
4
3
2
1
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
Relative Error
850
800
750
700
650
600
550
500
450
0
5
10
15
20
Number of Iterations

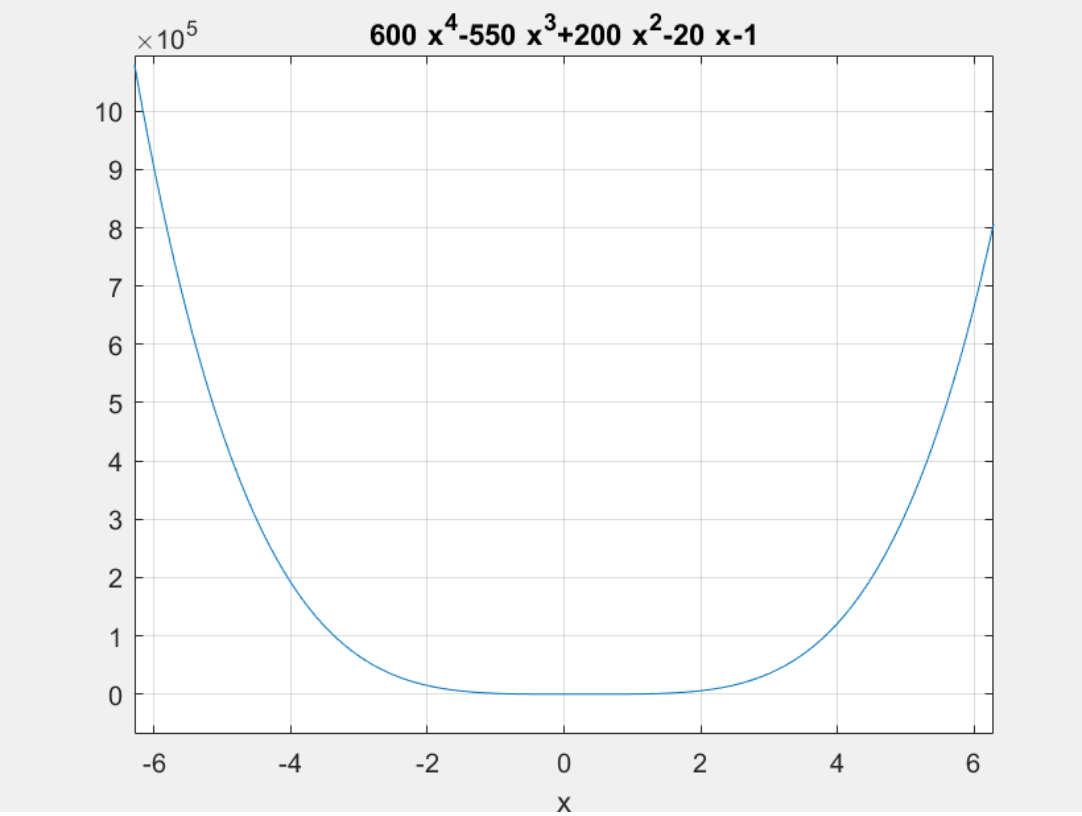
4. **Newton-Raphson**

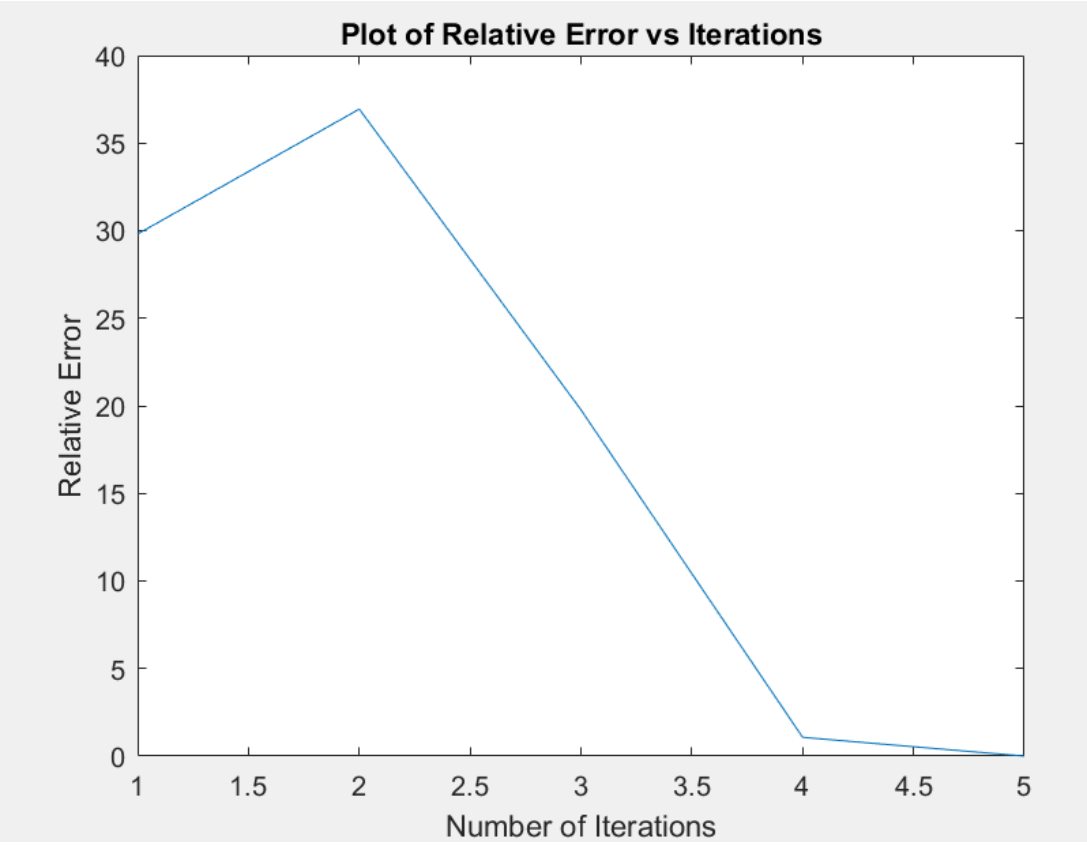
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
4
Enter the function f(x)
600*x^4 - 550*x^3 + 200*x^2 - 20*x - 1
Enter the first derivative of function f(x)
2400*x^3-1650*x^2+400*x-20
Enter the starting point
0.5
Enter stopping criteria:
Enter the maximum relative error allowed (in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

Root is: 0.232353


600 x^4-550 x^3+200 x^2-20 x-1
×10^5
10
9
8
7
6
5
4
3
2
1
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
Relative Error
40
35
30
25
20
15
10
5
0
1
1.5
2
2.5
3
3.5
4
4.5
5
Number of Iterations

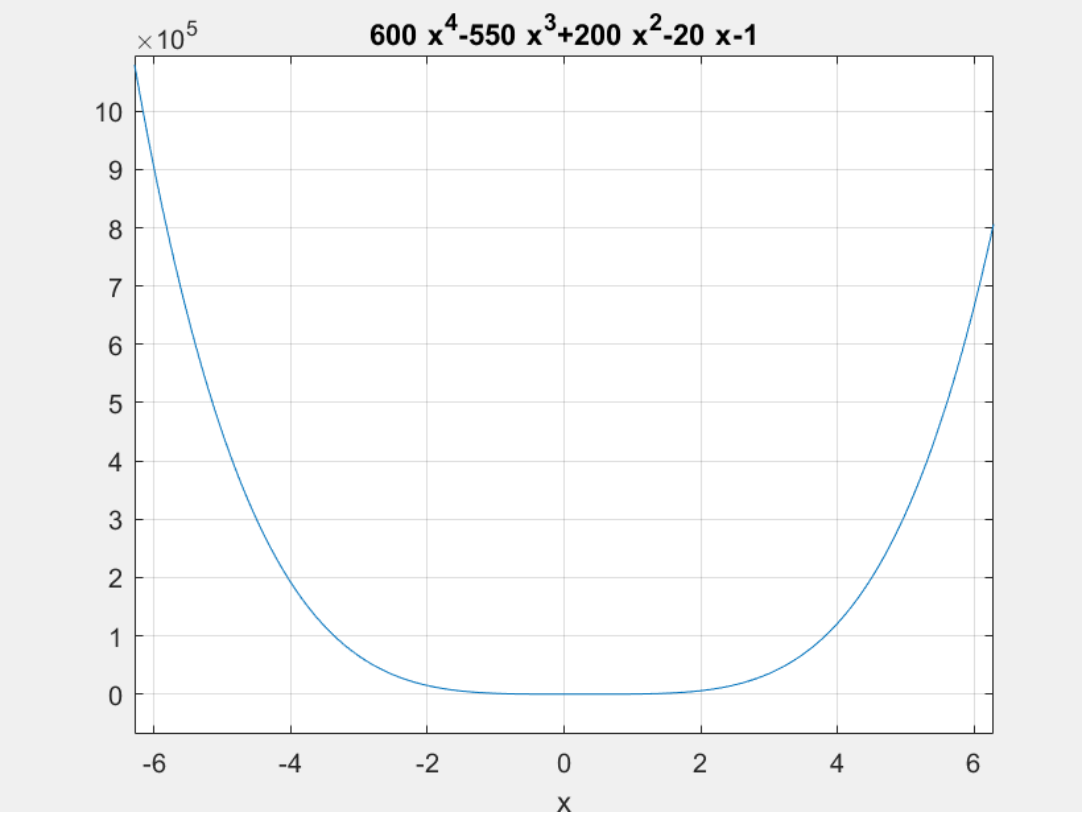
5. **Secant**

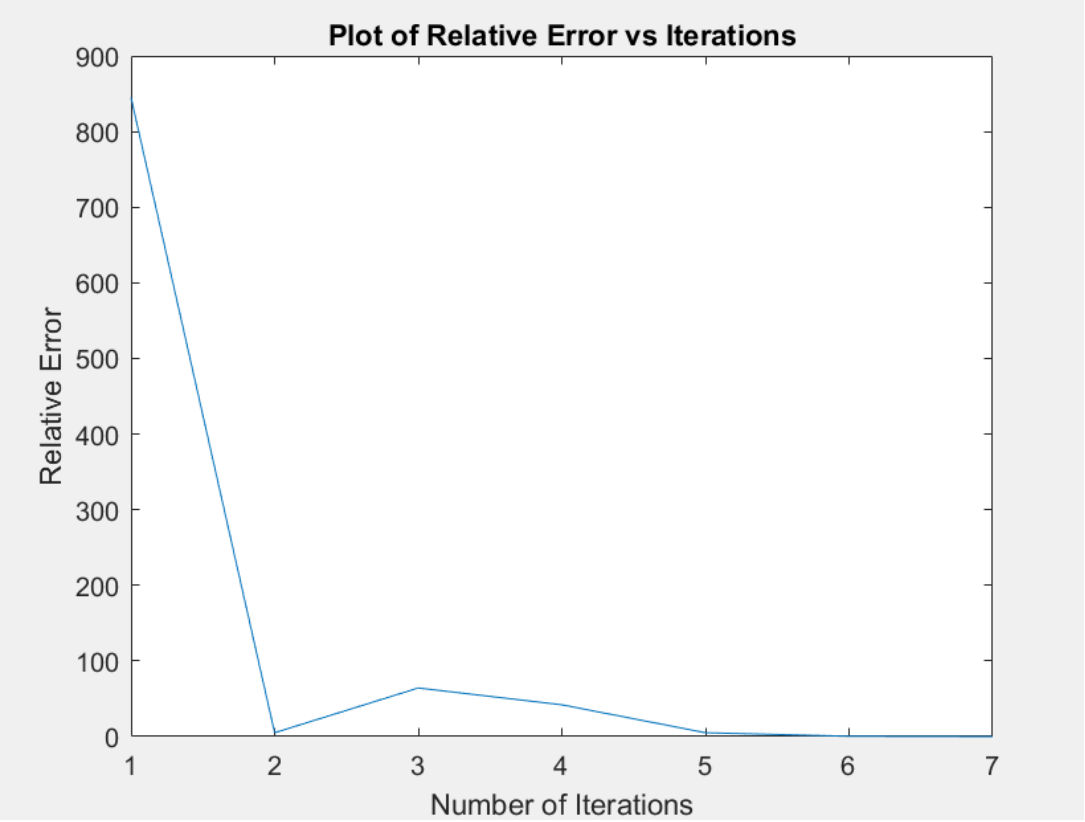
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
5
Enter the function f(x)
600*x^4 - 550*x^3 + 200*x^2 - 20*x - 1
Enter the first starting point
0.1
Enter the second starting point
1.0
Enter stopping criteria:\n
Enter the maximum relative error allowed (in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

Root is: 0.232353


600 x^4-550 x^3+200 x^2-20 x-1
×10^5
10
9
8
7
6
5
4
3
2
1
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
900
800
700
600
500
400
300
200
100
0
Relative Error
1
2
3
4
5
6
7
Number of Iterations

TEST CASE-2 : f(x)= exp(-x)-x= 0

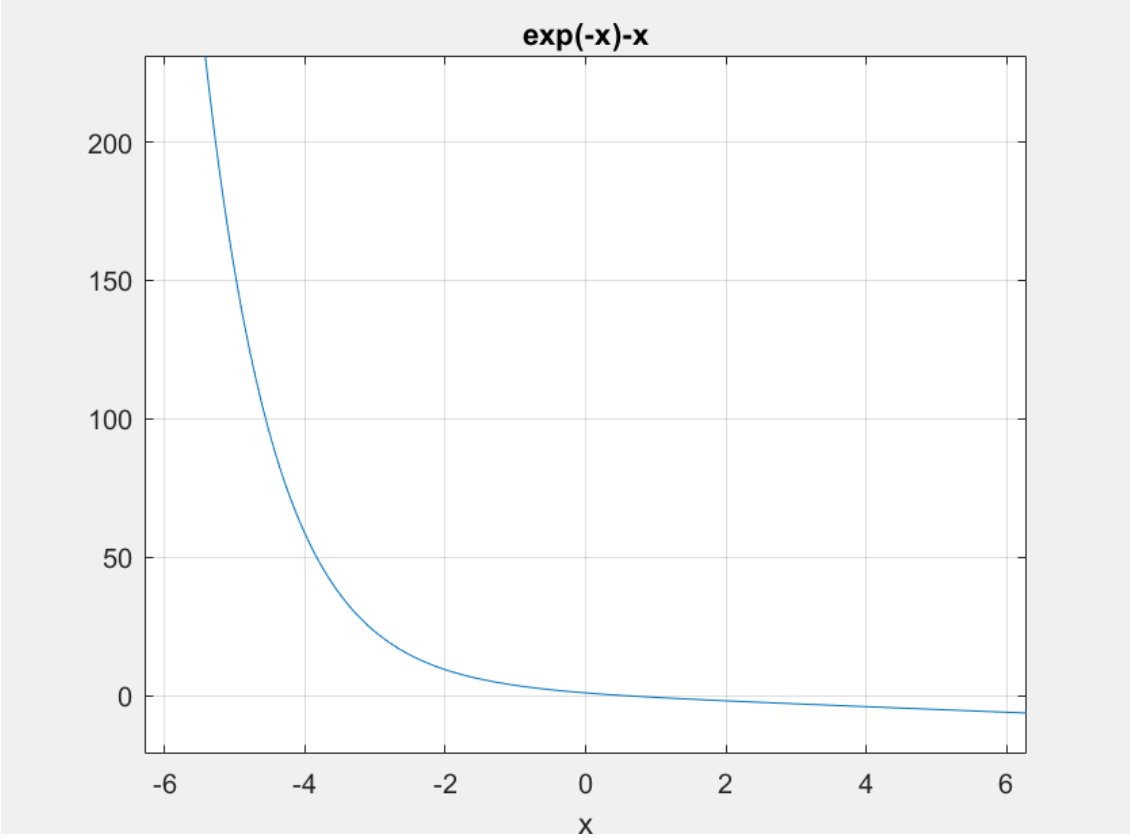
1. **Bisection**

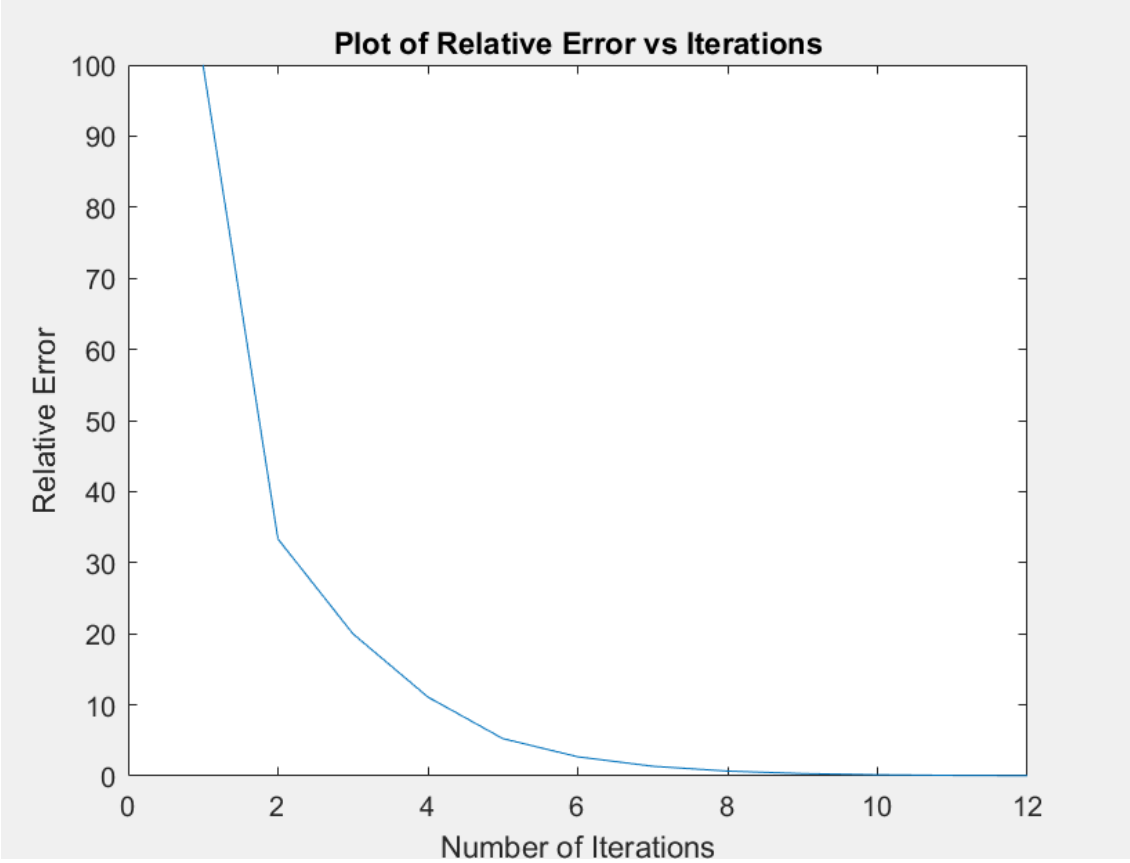
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
1
Enter the function f(x)
exp(-x)-x
Enter the first starting point
0.0
Enter the second starting point
1.0
Enter stopping criteria:
Enter the maximum relative error allowed (in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

The root is: 0.567139


exp(-x)-x
200
150
100
50
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
Relative Error
100
90
80
70
60
50
40
30
20
10
0
0
2
4
6
8
10
12
Number of Iterations

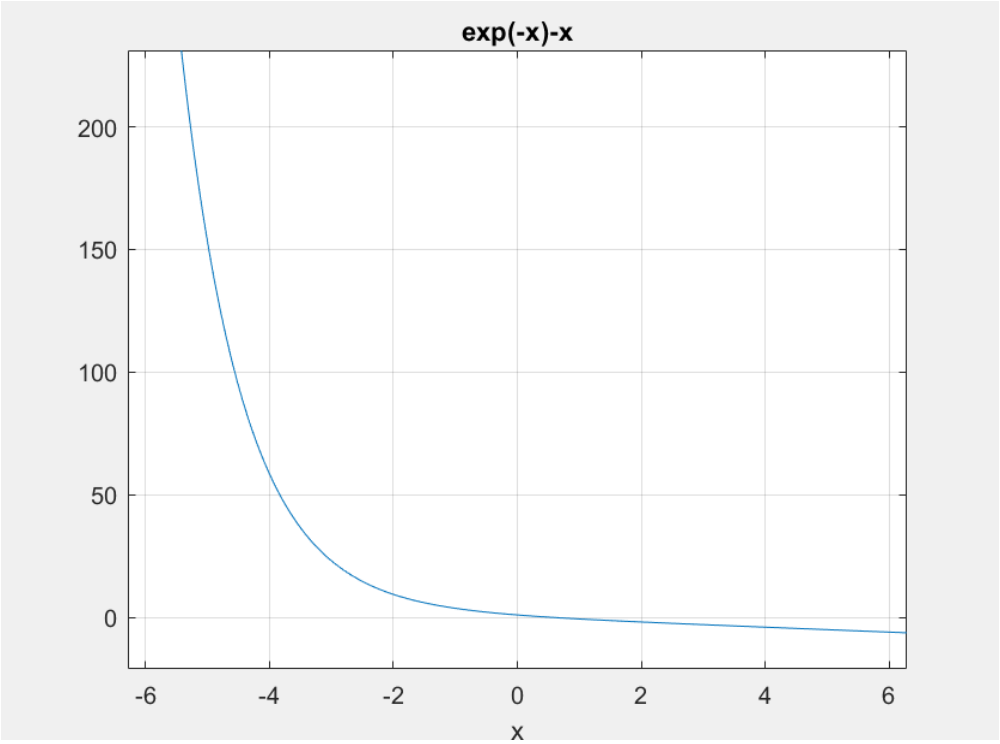
2. **False-position**

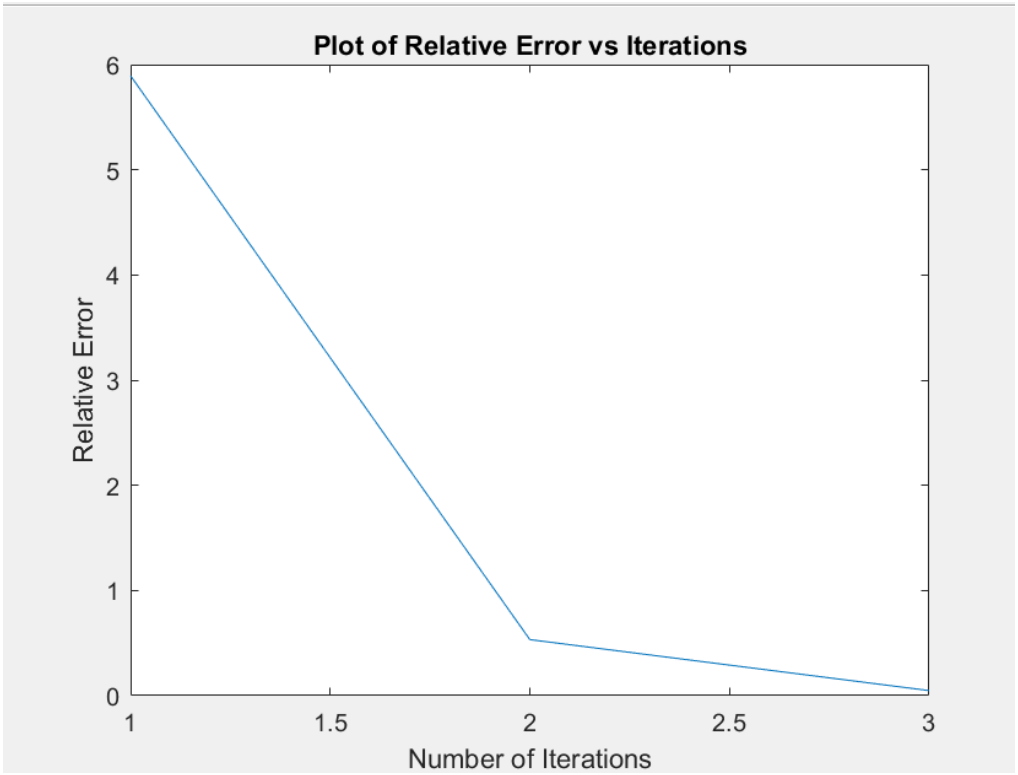
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
2
Enter the function f(x):
exp(-x)-x
Enter the first starting point
0.1
Enter the second starting point
1.0
Enter stopping criteria:
Enter the maximum relative error allowed(in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

The root is: 0.567444


exp(-x)-x
200
150
100
50
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
Relative Error
6
5
4
3
2
1
0
1
1.5
2
2.5
3
Number of Iterations

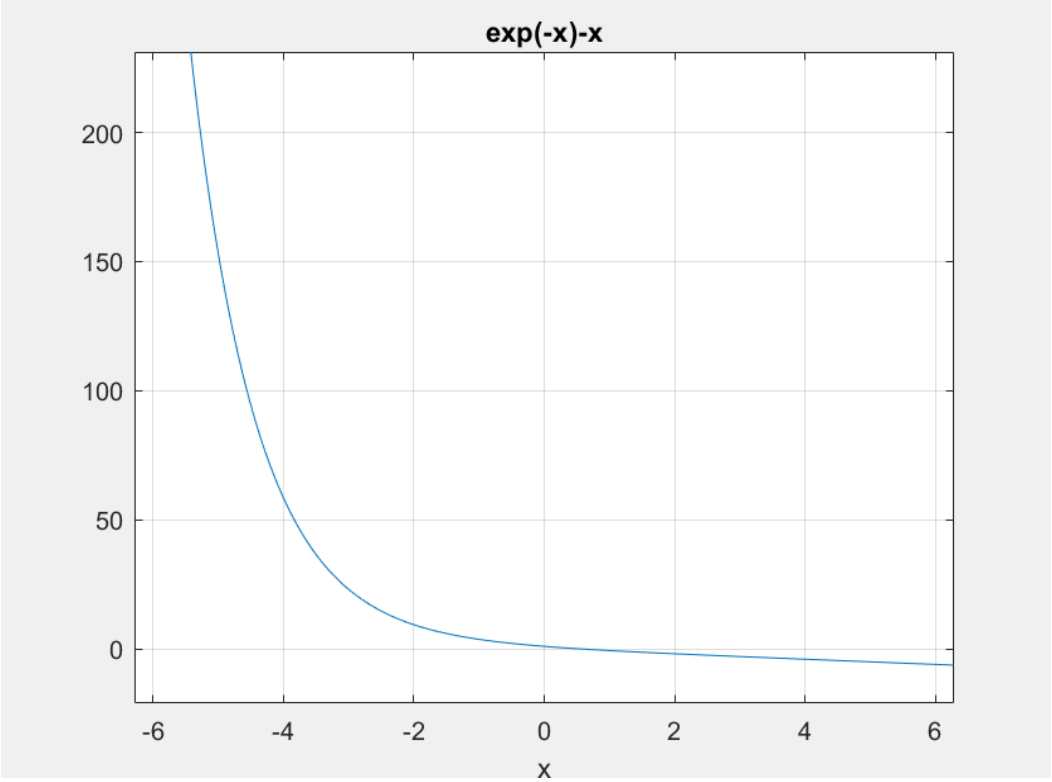
3. **Modified false-position**

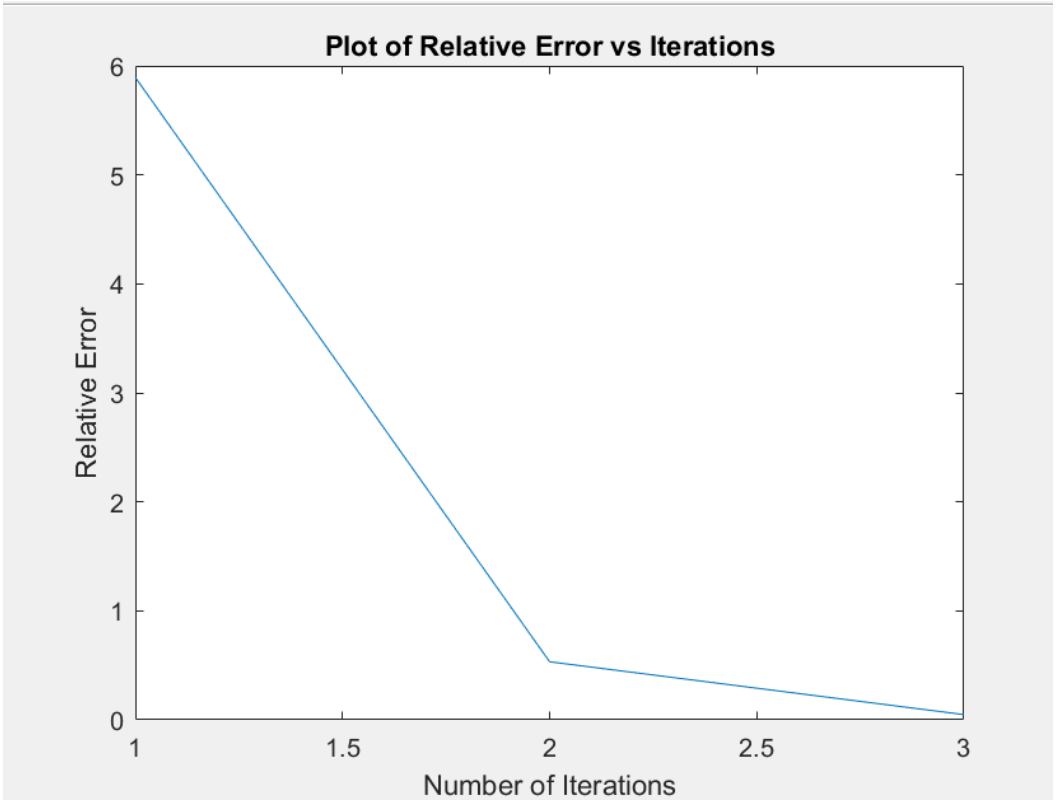
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
3
Enter the function f(x)
exp(-x)-1
Enter the first starting point
0.0
Enter the second starting point
1.0
Enter stopping criteria:
Enter the maximum relative error allowed (in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

The root is: 0.567444


exp(-x)-x
200
150
100
50
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
Relative Error
6
5
4
3
2
1
0
1
1.5
2
2.5
3
Number of Iterations

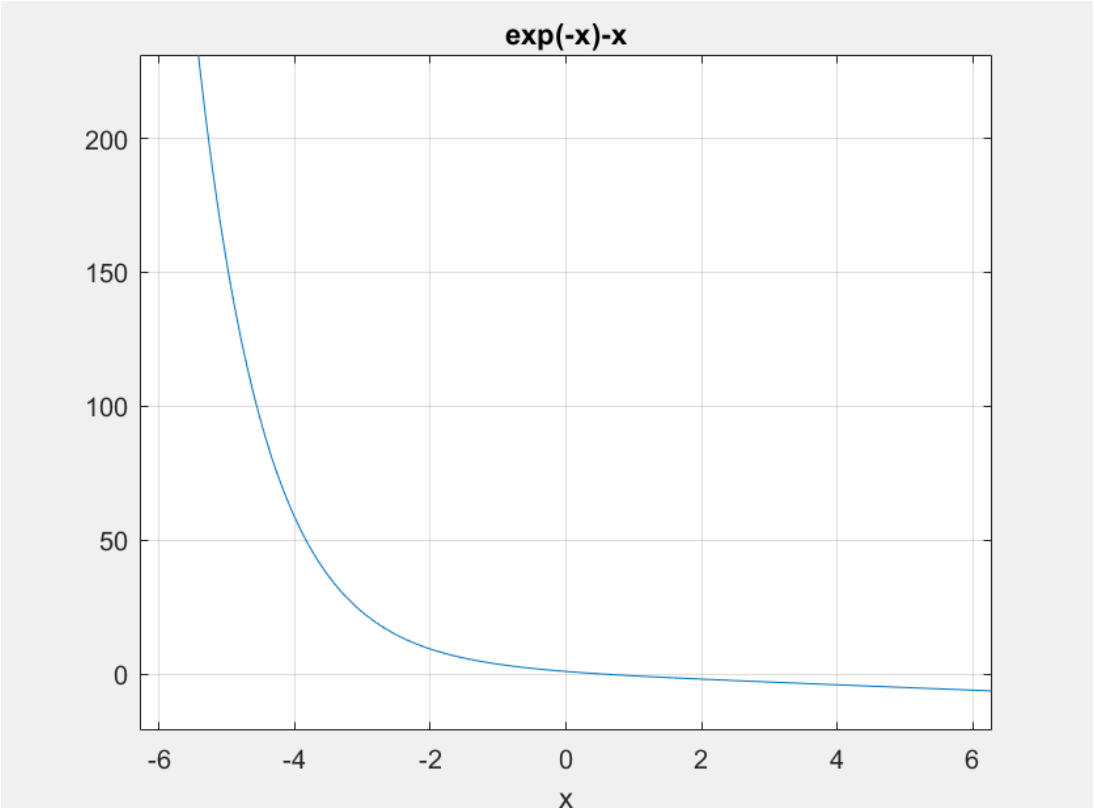
4. **Newton-Raphson**

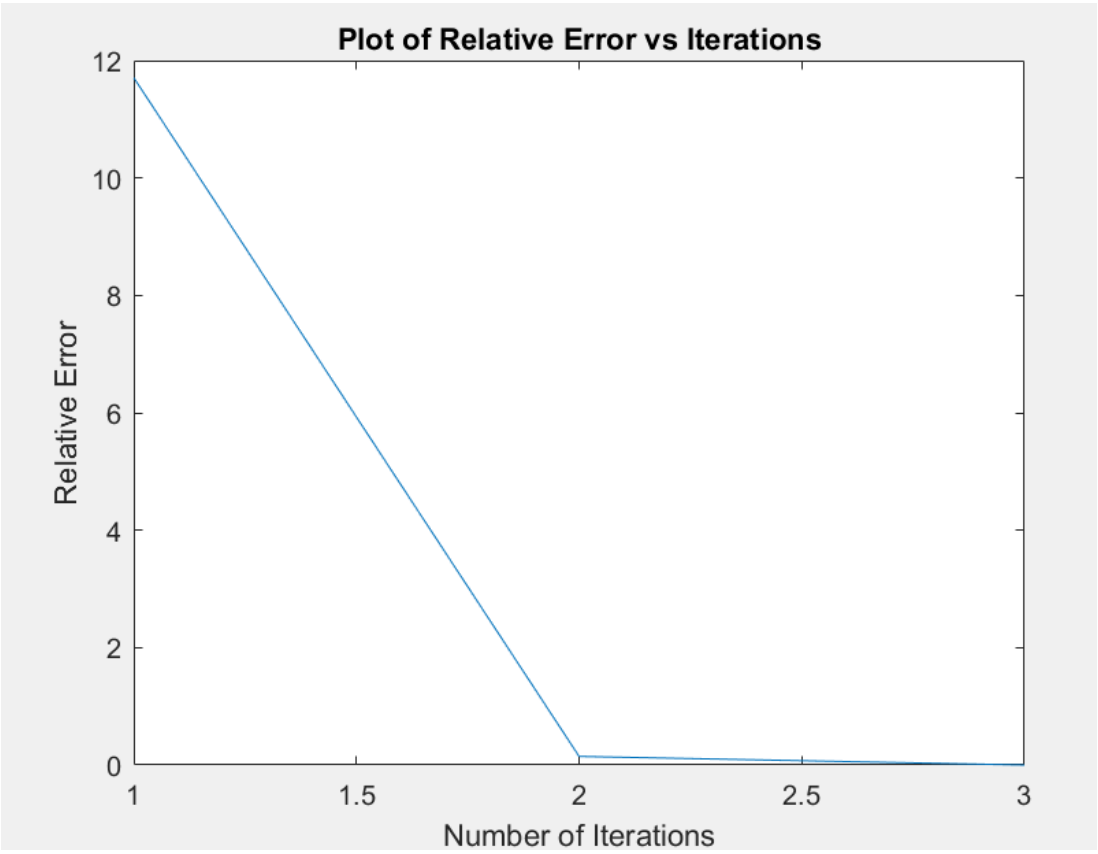
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
4
Enter the function f(x)
exp(-x)-x
Enter the first derivative of function f(x)
-exp(-x)-1
Enter the starting point
0.5
Enter stopping criteria:
Enter the maximum relative error allowed (in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

Root is: 0.567143


exp(-x)-x
200
150
100
50
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
12
10
8
6
4
2
0
Relative Error
1
1.5
2
2.5
3
Number of Iterations

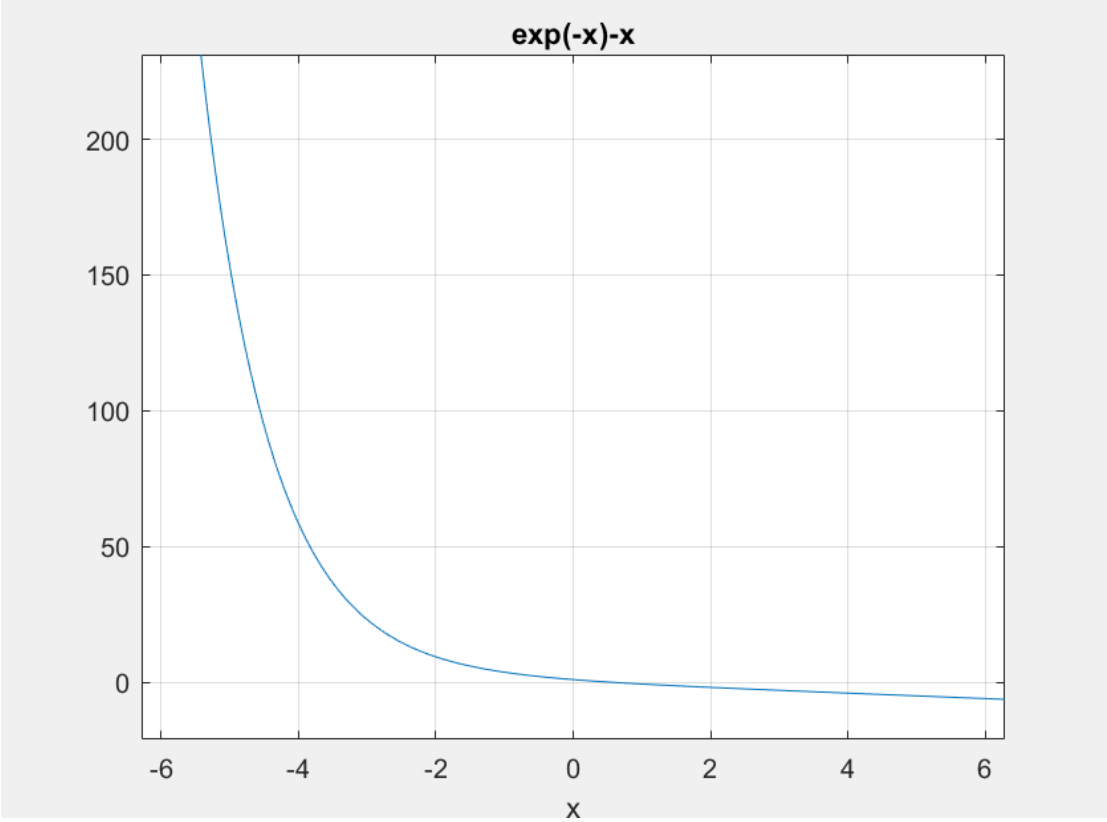
5. **Secant**

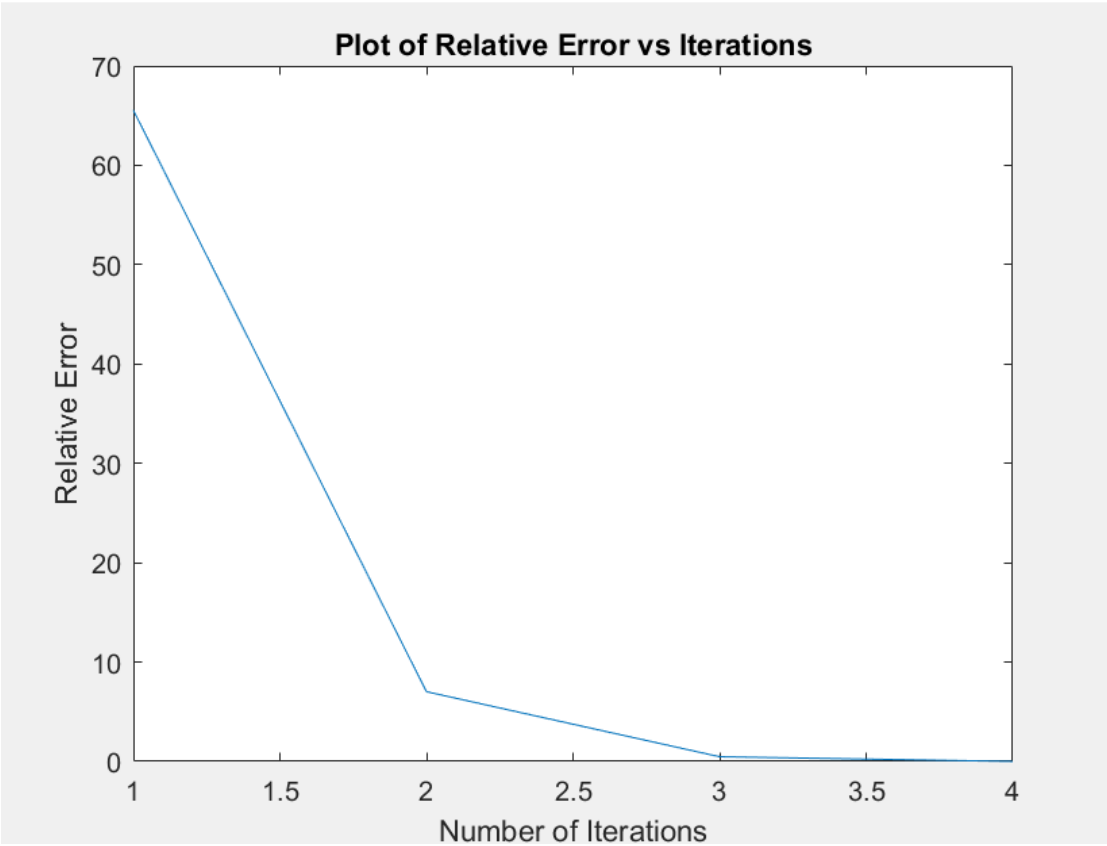
INPUT:

Choose the method of solution by selecting number shown with method:
Bisection-1,
False Position-2,
Modified False Position-3,
Newton-Raphson-4,
Secant-5
5
Enter the function f(x)
exp(-x)-x
Enter the first starting point
0.1
Enter the second starting point
1.0
Enter stopping criteria:\n
Enter the maximum relative error allowed (in %)
0.05
Enter the maximum number of iterations allowed
20

OUTPUT:

Root is: 0.567143


exp(-x)-x
200
150
100
50
0
-6
-4
-2
0
2
4
6
x


Plot of Relative Error vs Iterations
Relative Error
70
60
50
40
30
20
10
0
1
1.5
2
2.5
3
3.5
4
Number of Iterations