SUDHANSHU KUMAR	ROLL NO. 201010	SECTION: J9

ESO208A

ASSIGNMENT 1

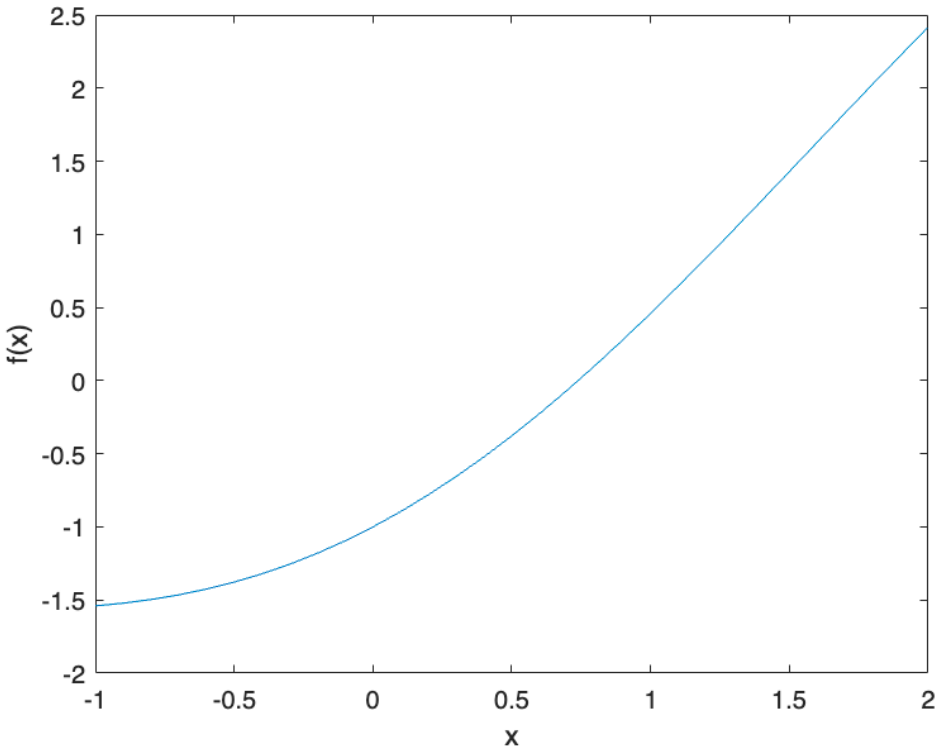
QUESTION1

Test functions:

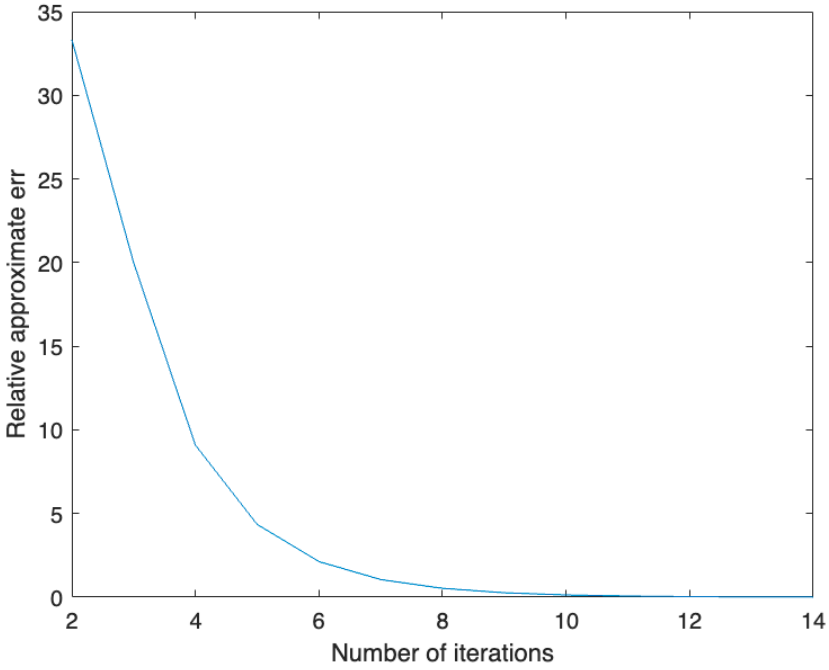
$$f(x) = x - \cos x$$

Use the initial bracket as (0,1) or the initial guess as 0; maximum iterations 50; and maximum $\varepsilon_r = 0.01\%$. For Fixed-Point method, use $\phi(x)=\cos x$.

1. BISECTION

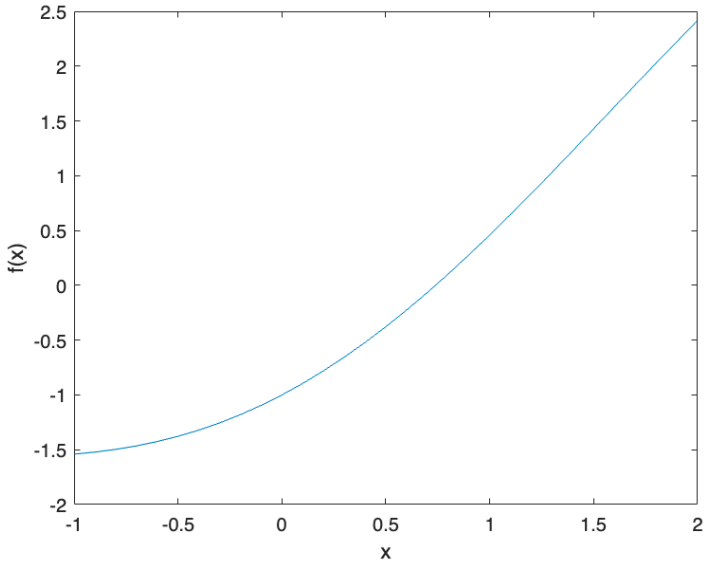


```
The root of the equation: 0.739075
```

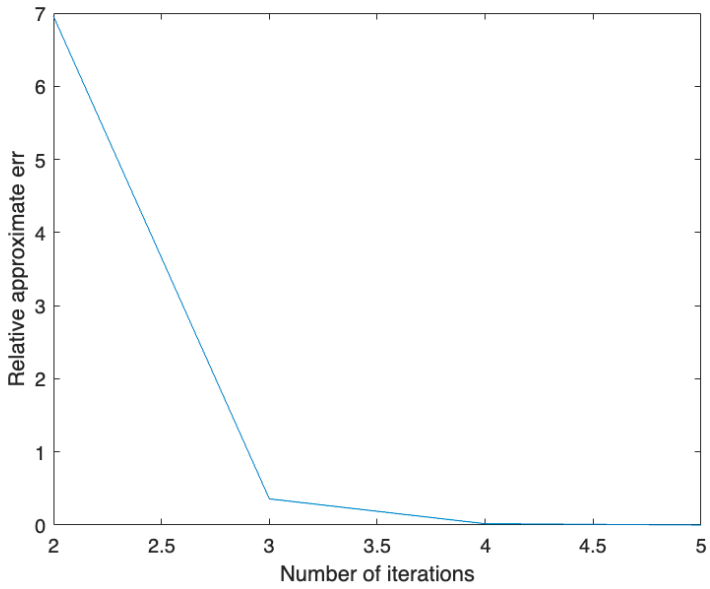


2. FALSE-POSITION

```
MaxErr = 0.0100
```

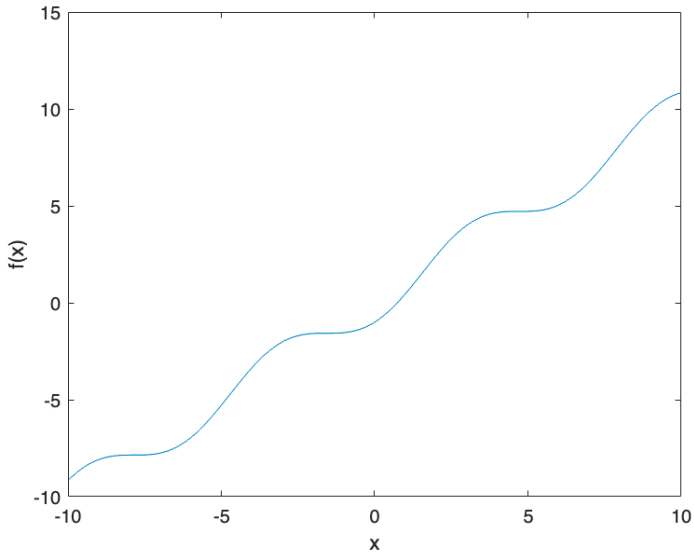


```
The root of the equation: 0.739085
```

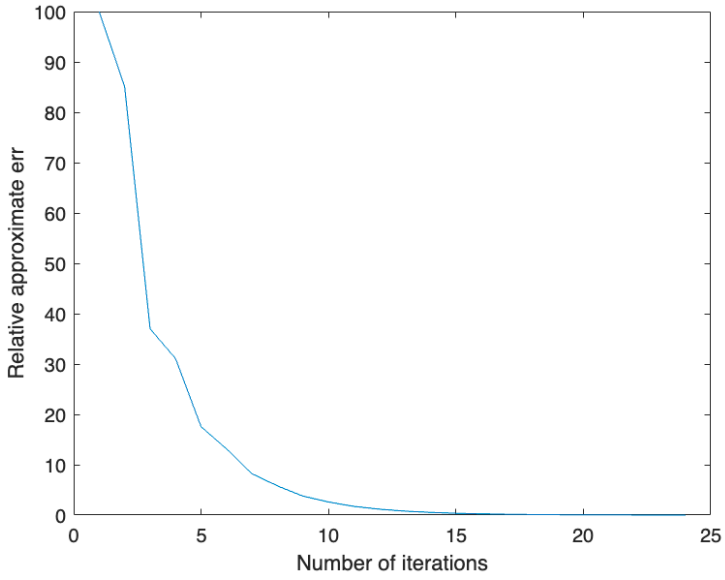


3. FIXED POINT

```
MaxErr = 0.0100
```

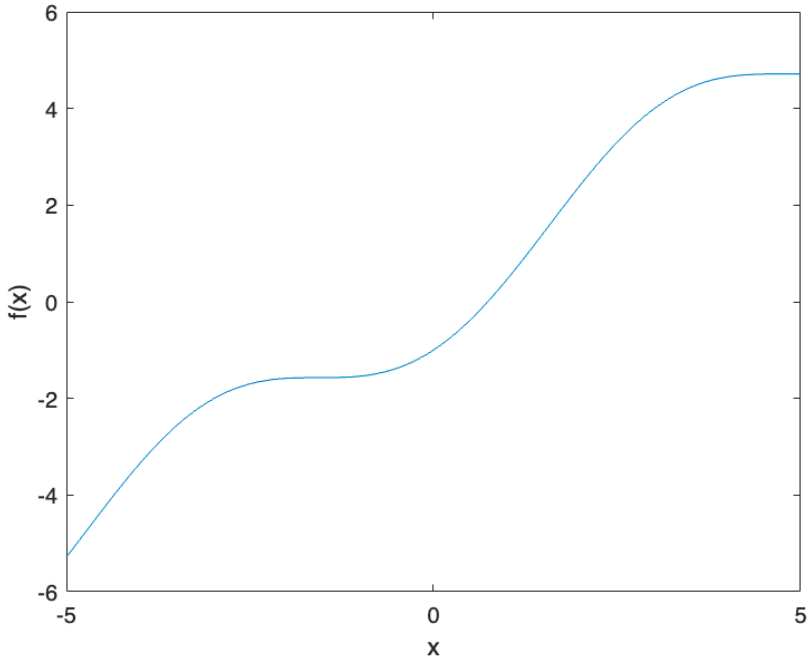


```
The root of the equation: 0.739106
```

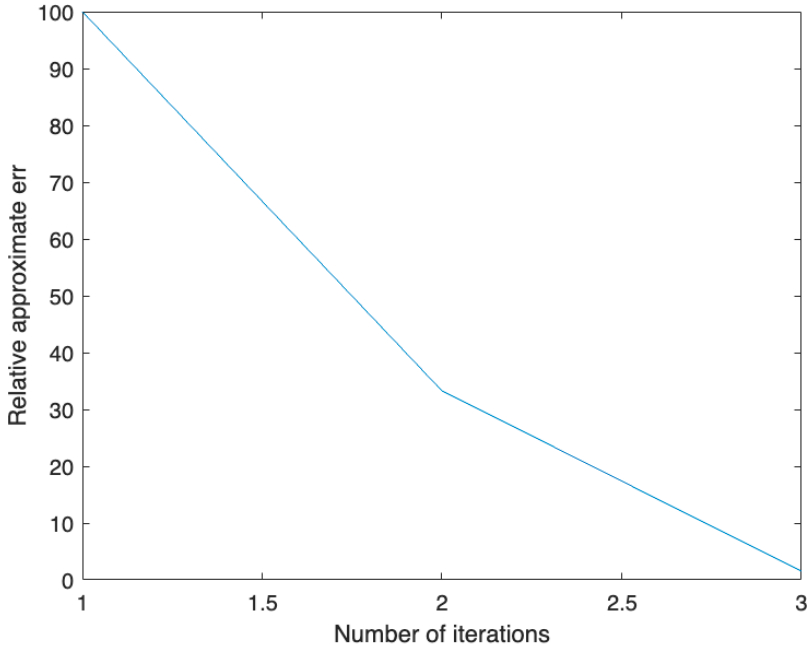


4. NEWTON RAPHSON

```
MaxErr = 0.0100
```

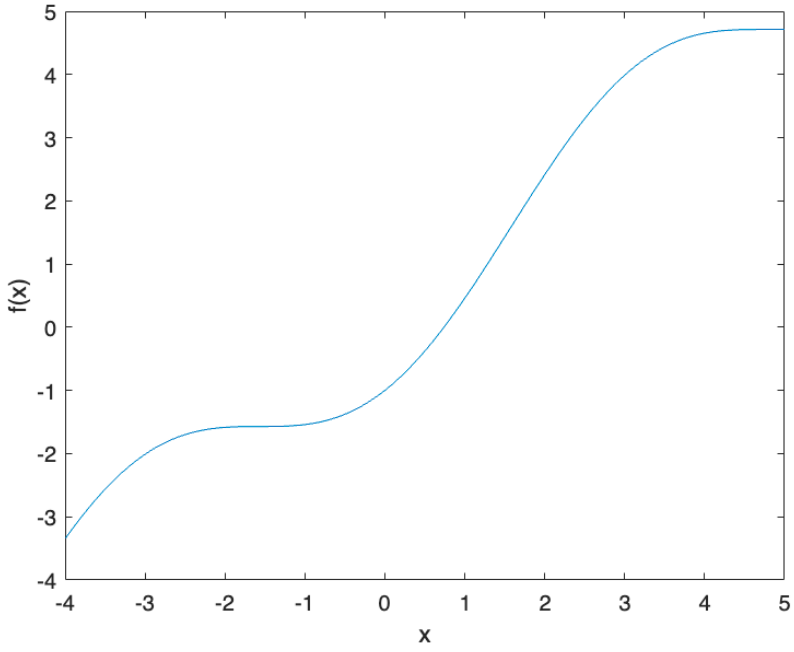


```
The root of the equation: 0.739085
```

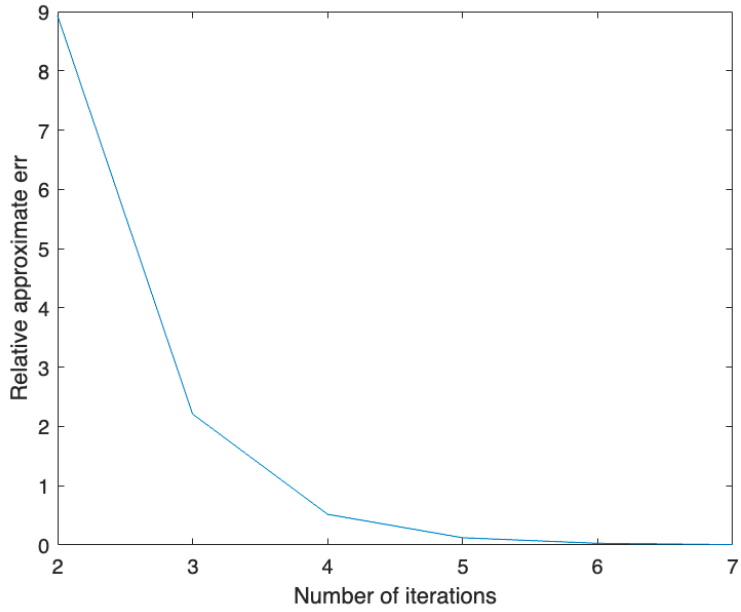


5. SECANT

```
MaxErr = 0.0100
```



```
The root of the equation: 0.739075
```

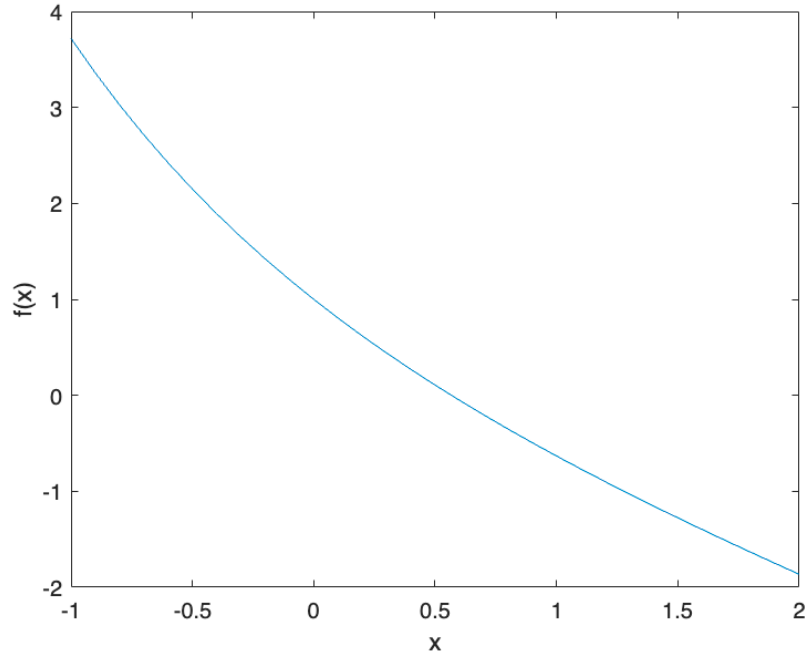


$$\boldsymbol{f(x) = exp(-x) - x = 0}$$

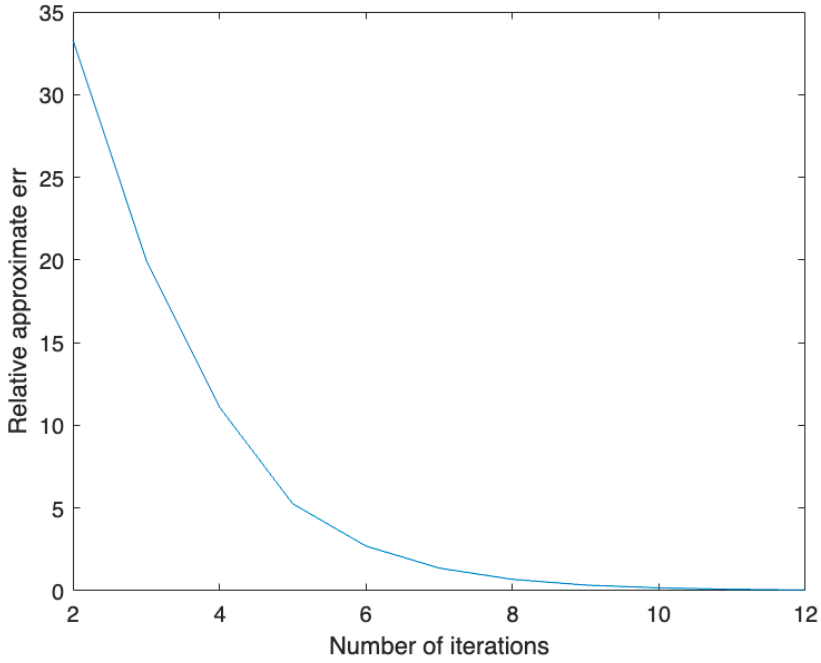
Use the initial bracket as (0,1) or the initial guess as 0; maximum iterations 50; and maximum $\varepsilon_r = 0.05\%$. For Fixed-Point method, use $\phi(x)=\exp(-x)$.

1. BISECTION

```
MaxErr = 0.0500
```

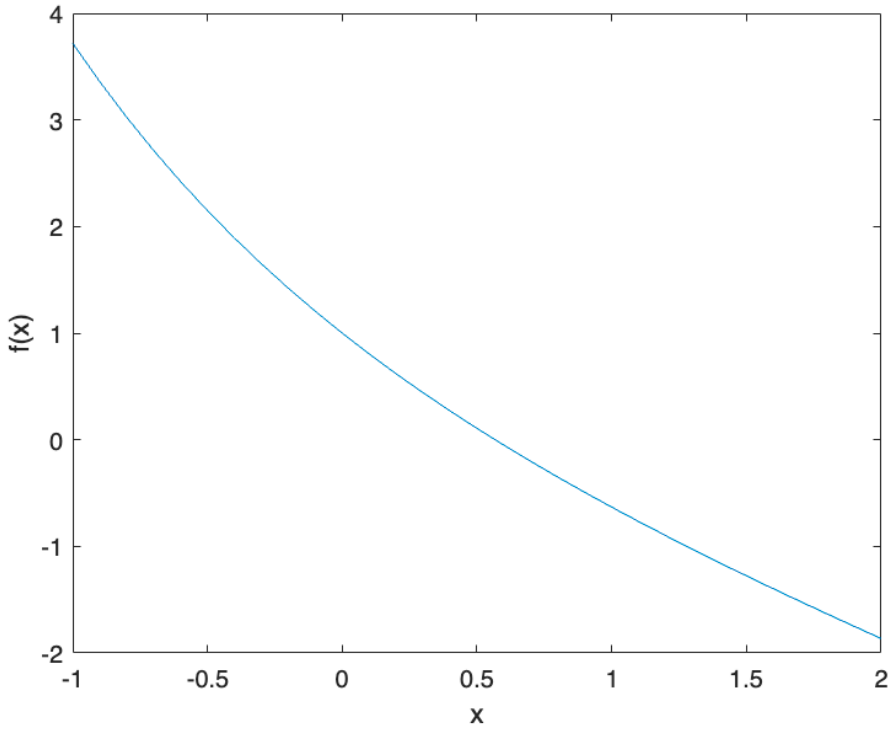


```
The root of the equation: 0.567139
```

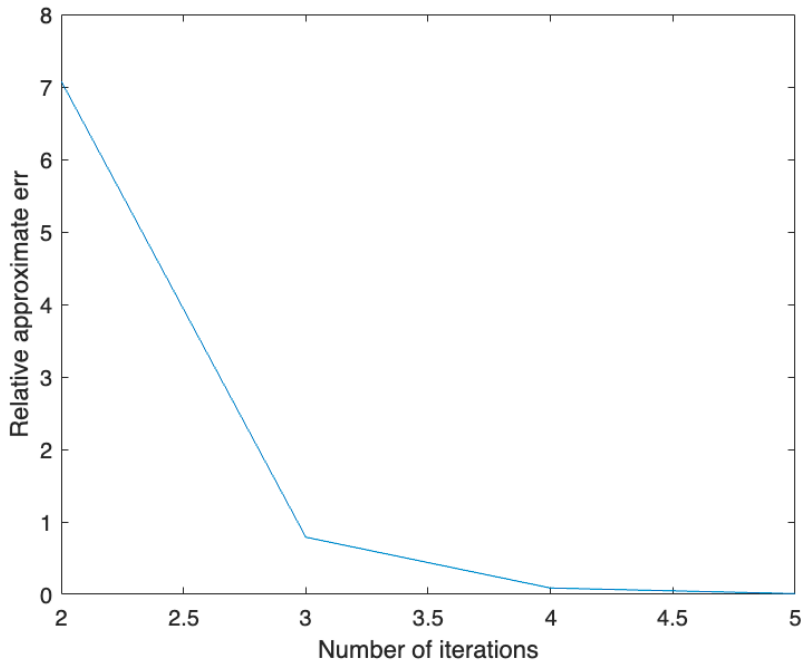


2. FALSE-POSITION

```
MaxErr = 0.0500
```

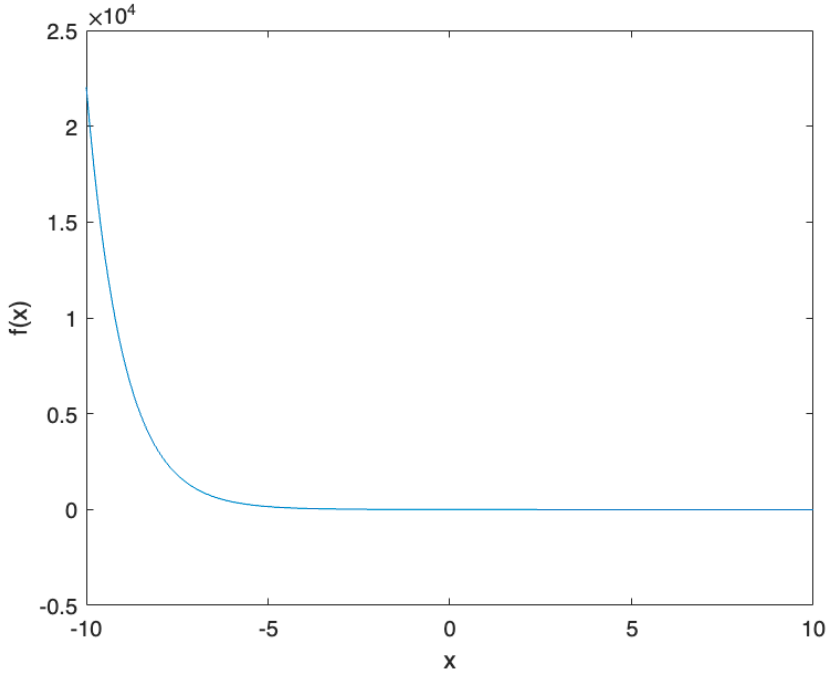


```
The root of the equation: 0.567150
```

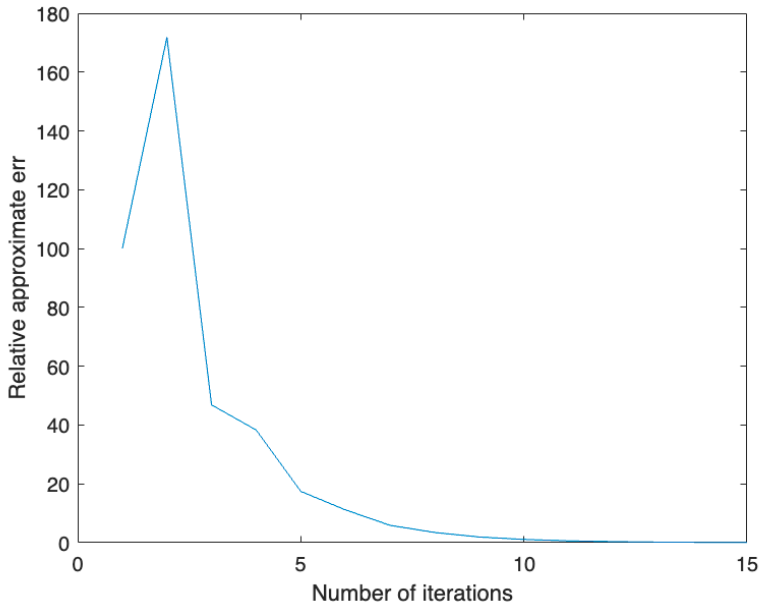


3. FIXED-POINT

```
MaxErr = 0.0500
```

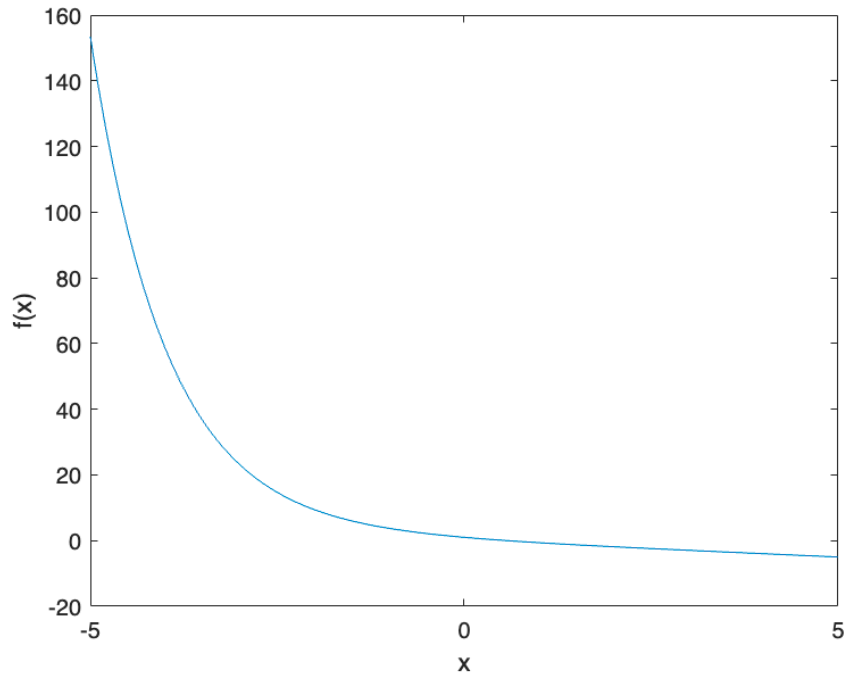


```
The root of the equation: 0.567068
```

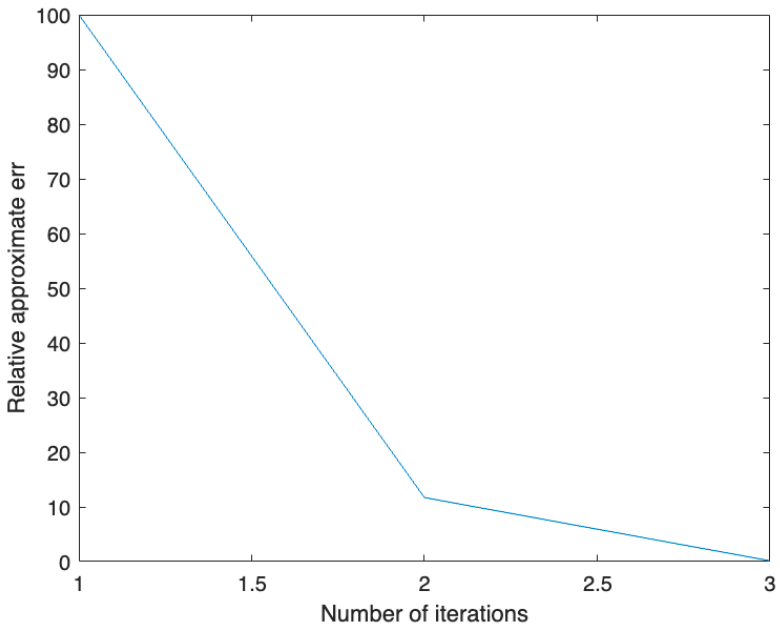


4. NEWTON-RAPHSON

```
MaxErr = 0.0500
```

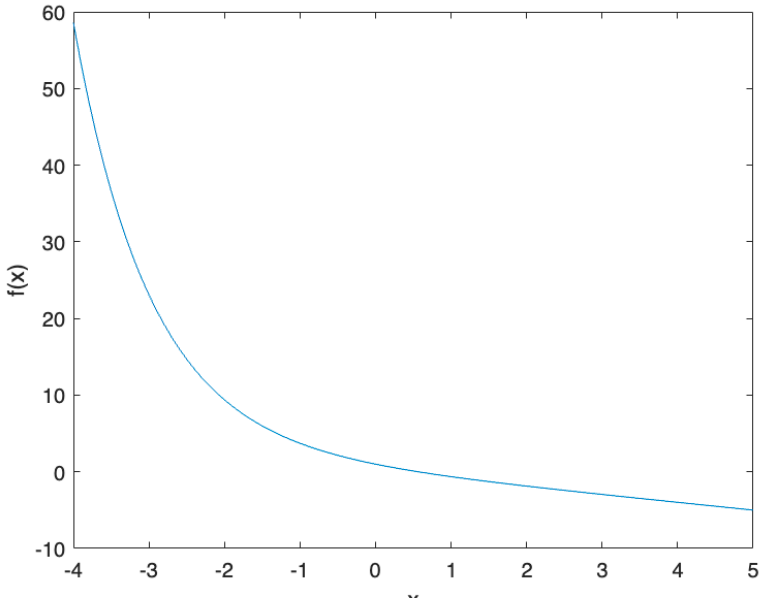


```
The root of the equation: 0.567143
```

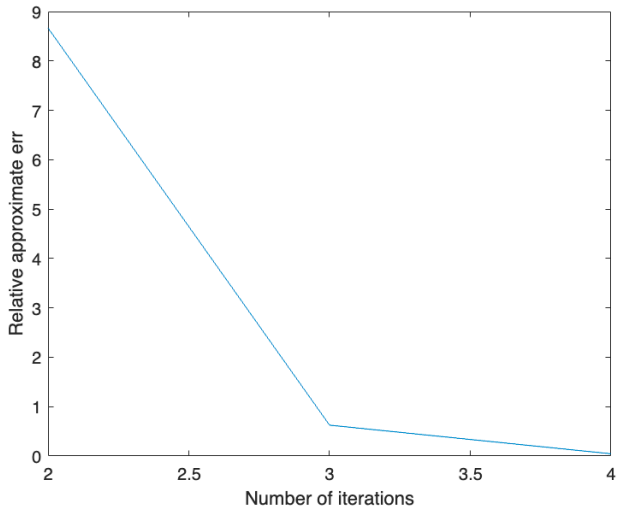


5. SECANT

```
MaxErr = 0.0500
```



```
The root of the equation: 0.567126
```



QUESTION2

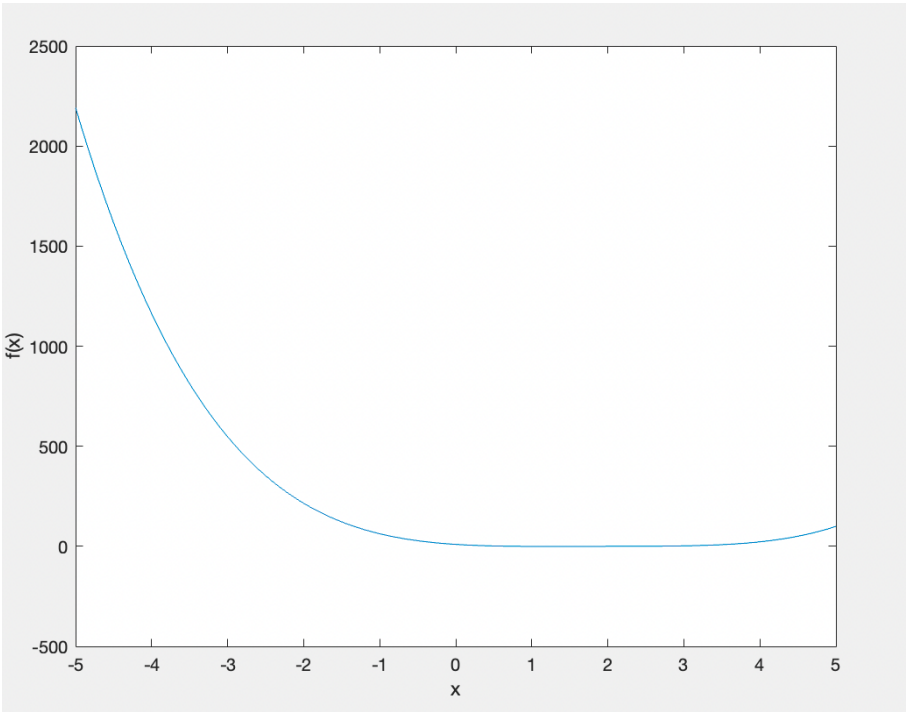
Test polynomial:

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

Maximum iteration: 50
Maximum relative approximate error: 0.01%

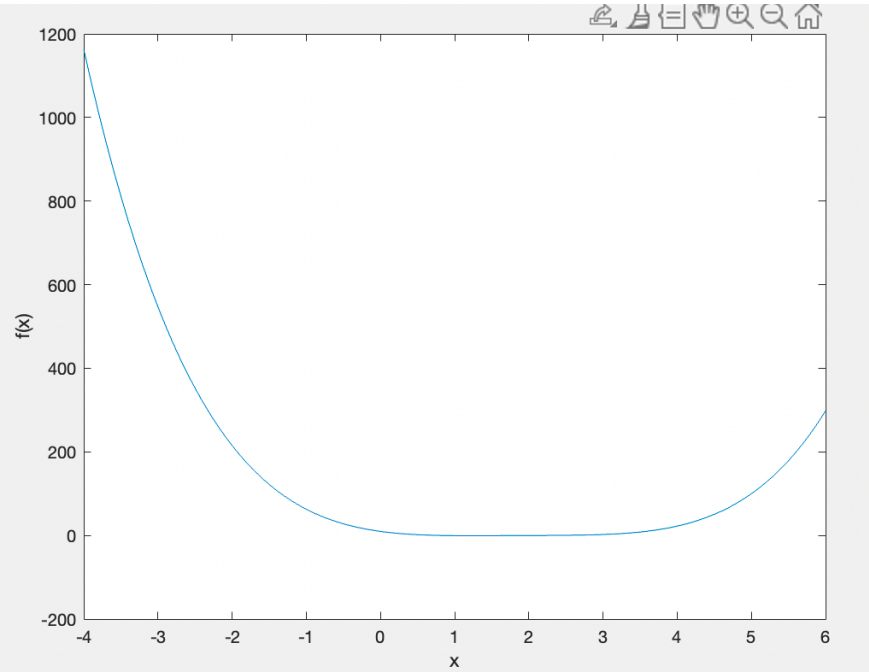
Muller method: (−1,0,1)

The root is 0.800000



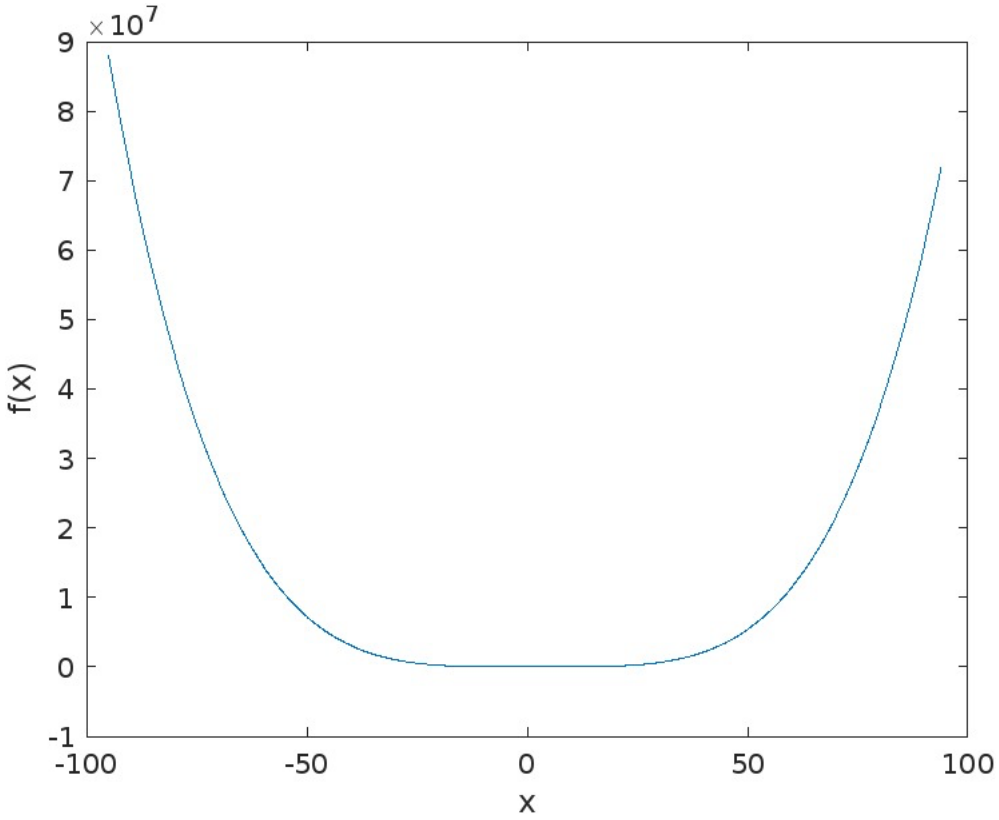
Muller method: (0,1,2)

The root is 2.200000



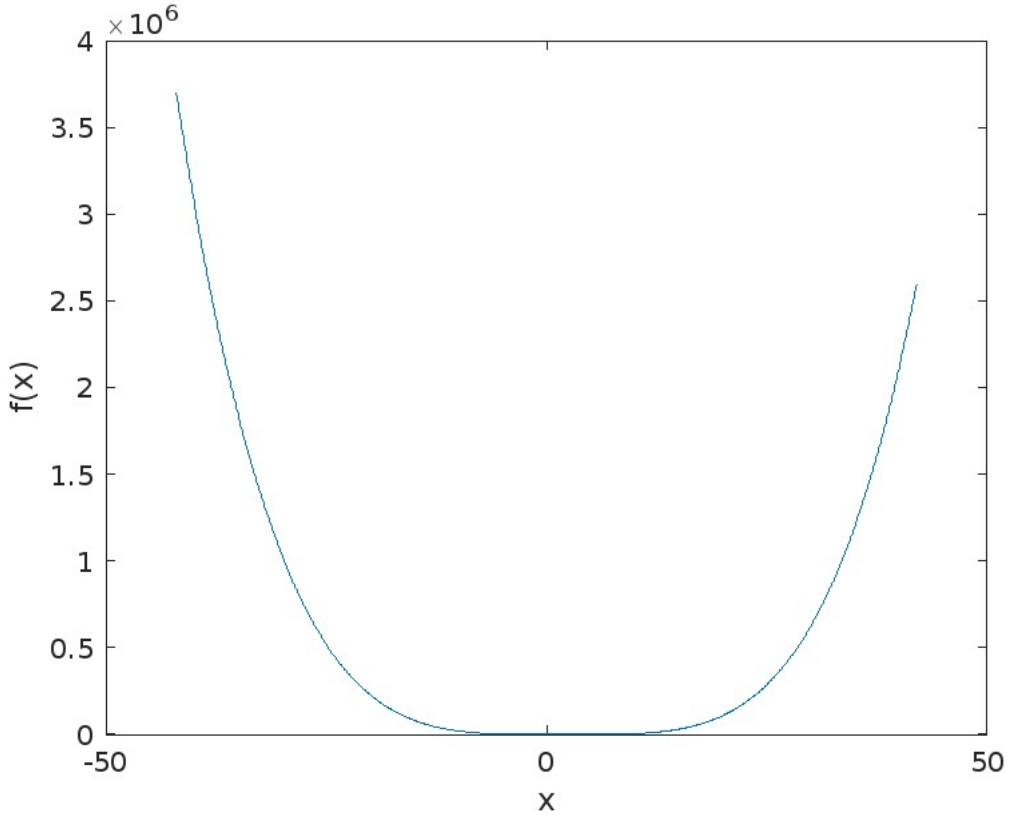
Bairstow method: ($\alpha_0 = -5$, $\alpha_1 = 4$)

The root is 2.200000 and 2.200000



Bairstow method: ($\alpha_0 = -2$, $\alpha_1 = 2$)

The root is 2.200000 and 0.800000


×10^6
4
3.5
3
2.5
2
1.5
1
0.5
0
f(x)
-50
0
50
x