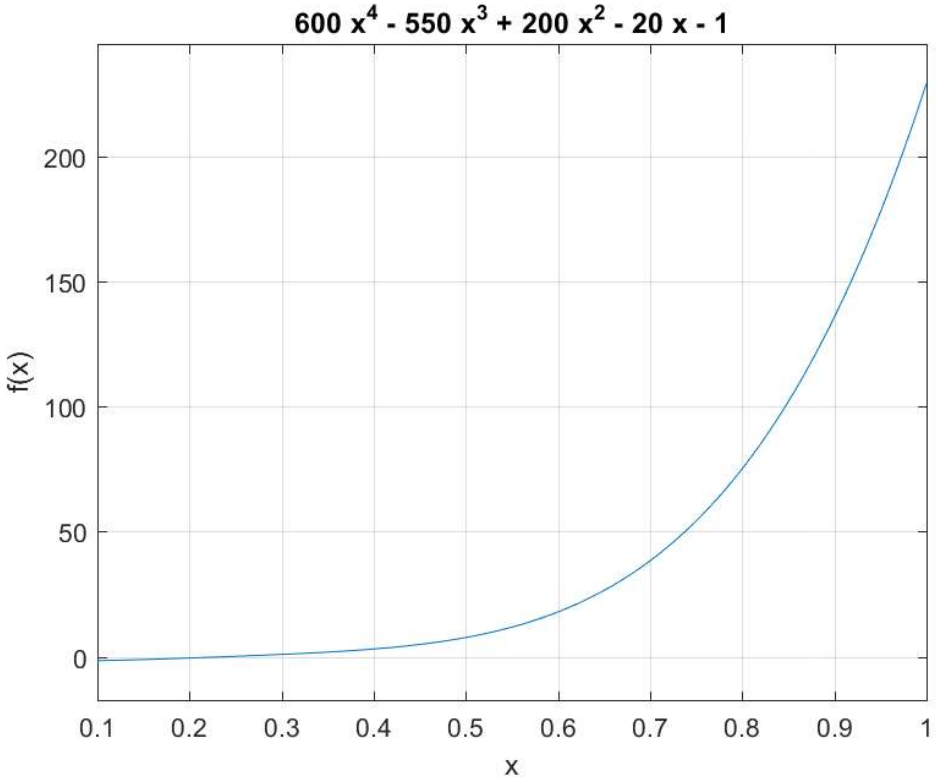
2nd Semester: Mini-Quiz 3
Solutions

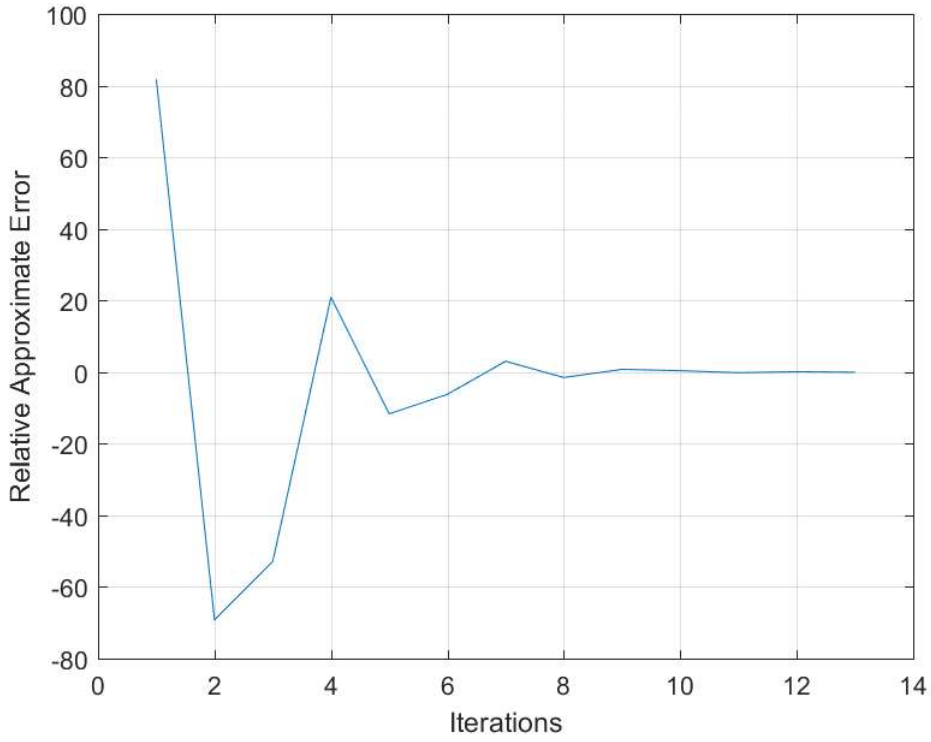
1. Bracketing and Open Methods

- $f(x) = 600x^4 - 550x^3 + 200x^2 - 20x - 1 = 0$



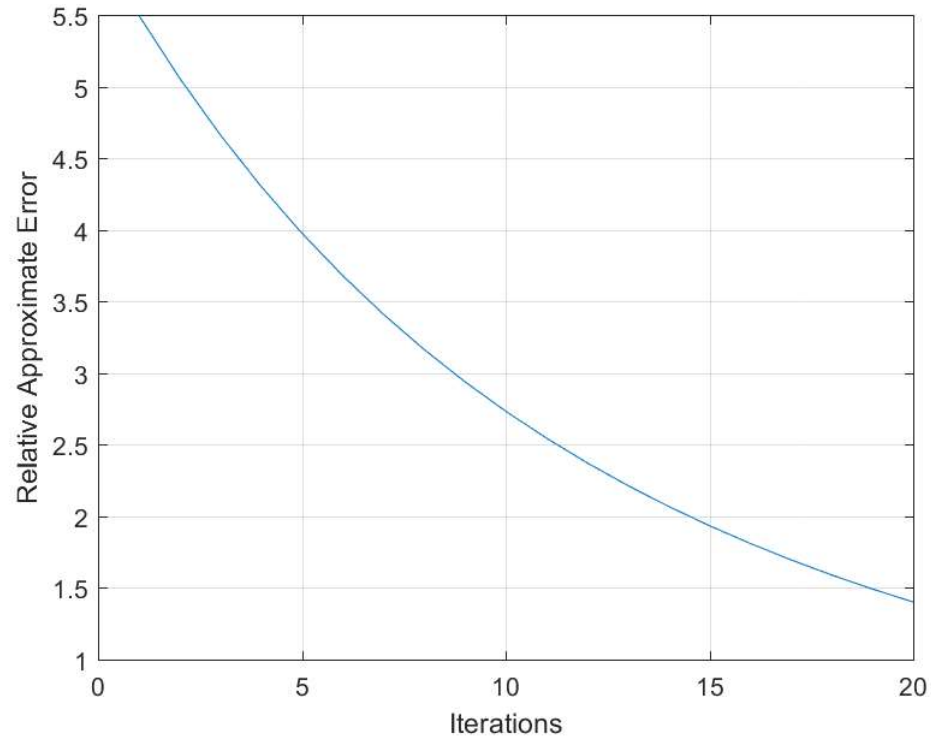
Bisection Method

Solution: 0.232385253906250



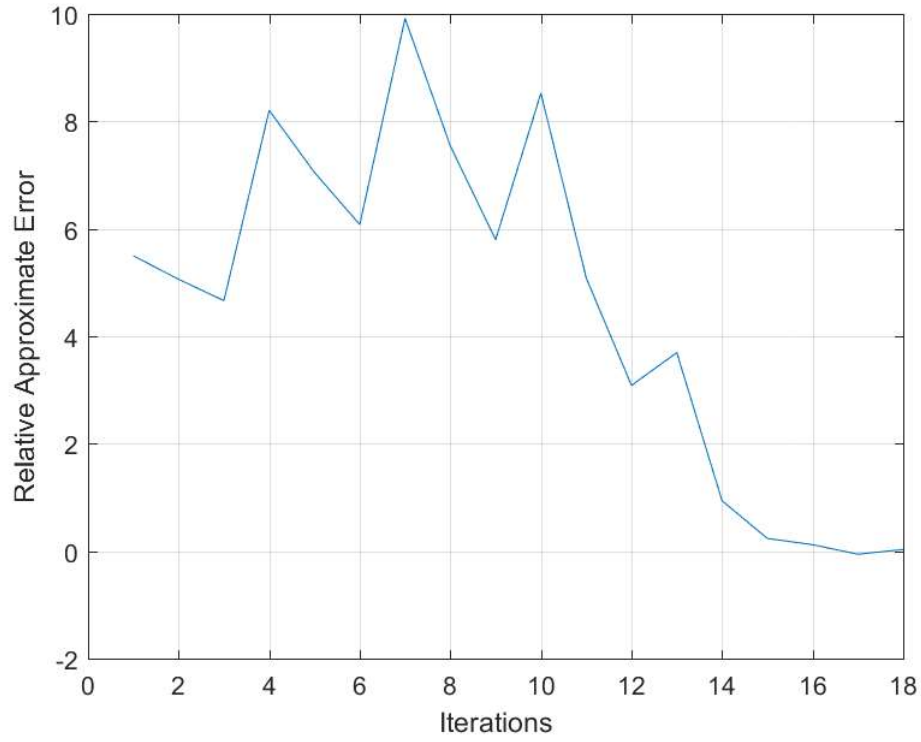
False-Position Method

Solution: 0.181460190072870



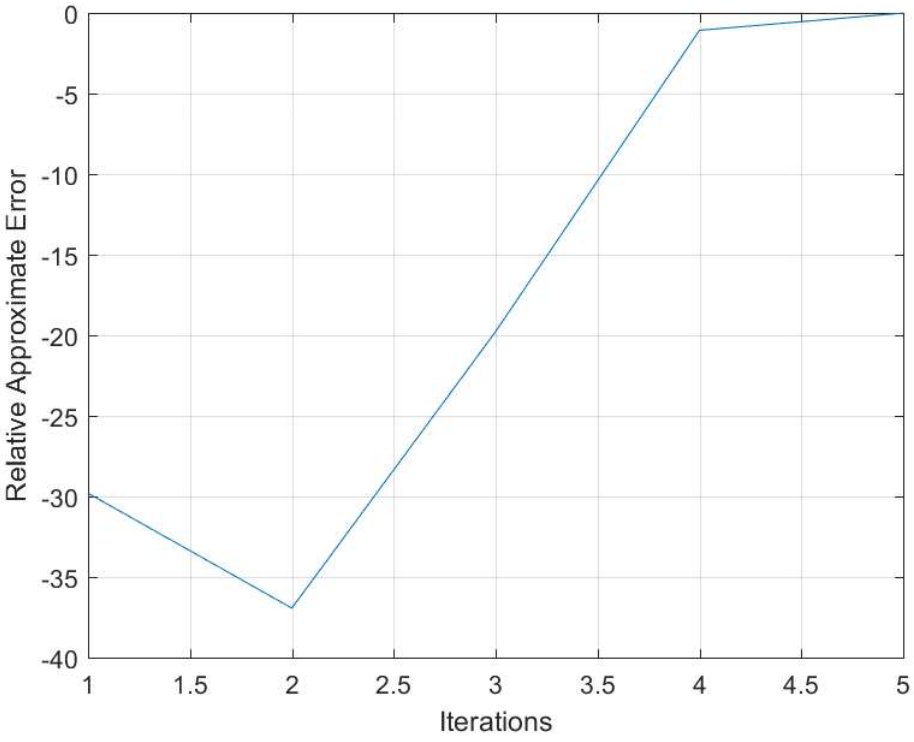
Modified False-Position Method

Solution: 0.232375629934491



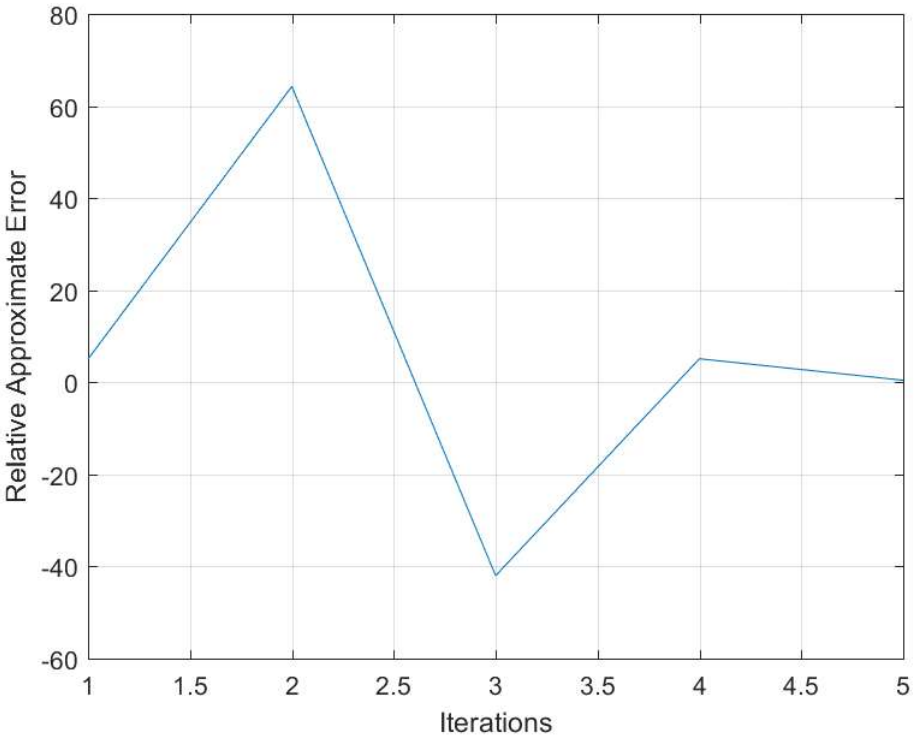
Newton-Raphson Method

Solution: 0.232352964768764



Secant Method

Solution: 0.232352956733991



Convergence and Stability

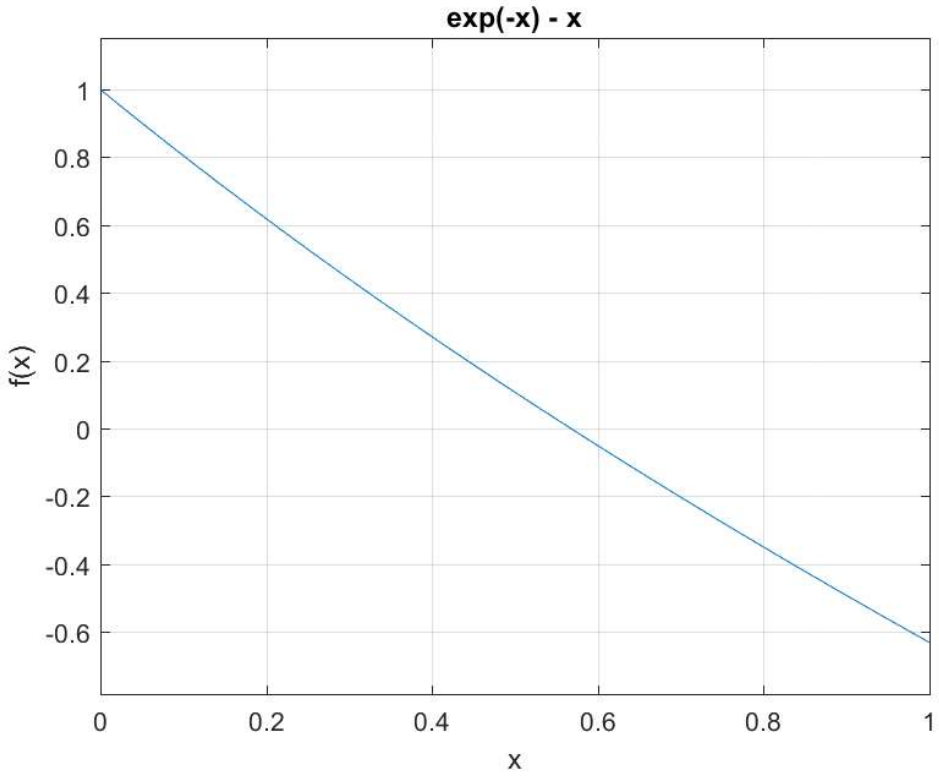
The order of convergence for the above methods is:

False-Position < Modified False-Position < Bisection < Secant < Newton-Raphson Method

The only unstable method for the function is:

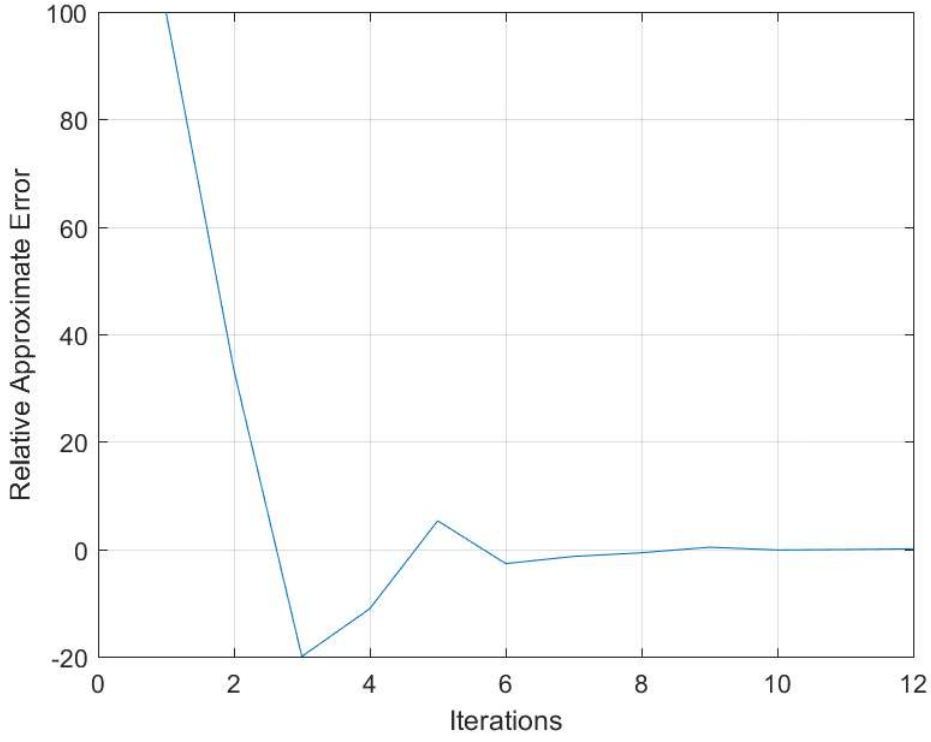
False-Position

- $f(x) = e^x - x = 0$



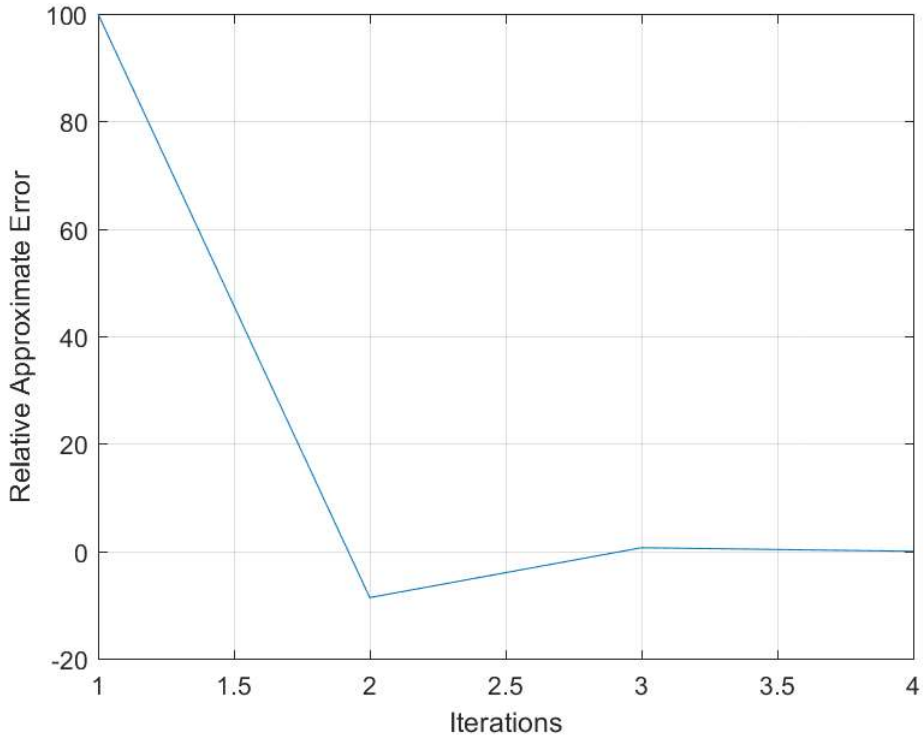
Bisection Method

Solution: 0.567138671875000



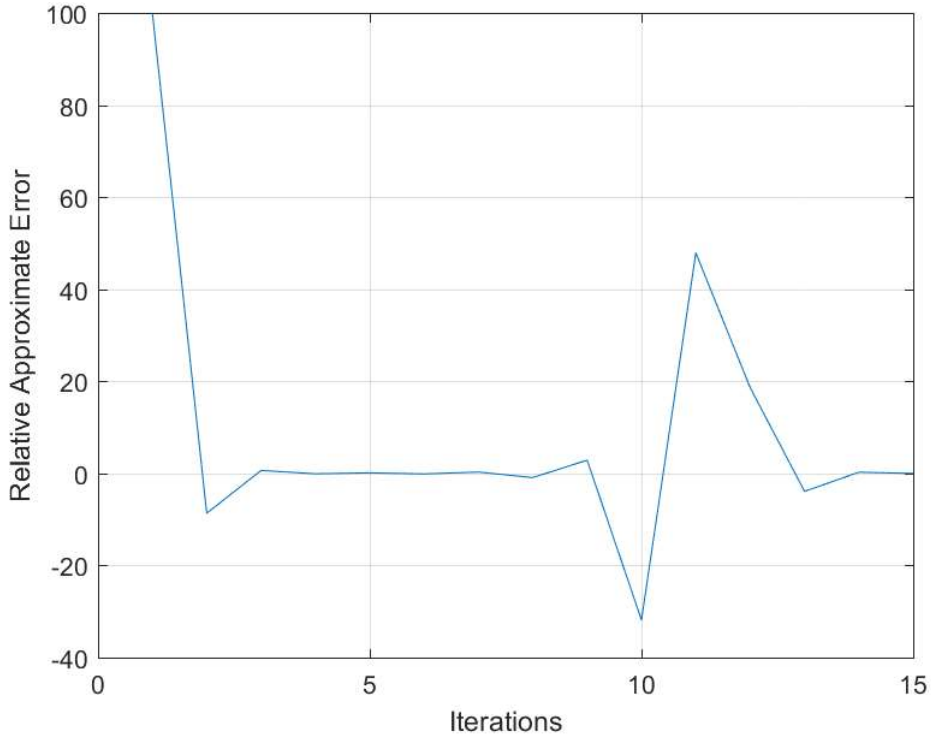
False-Position Method

Solution: 0.567125605548578



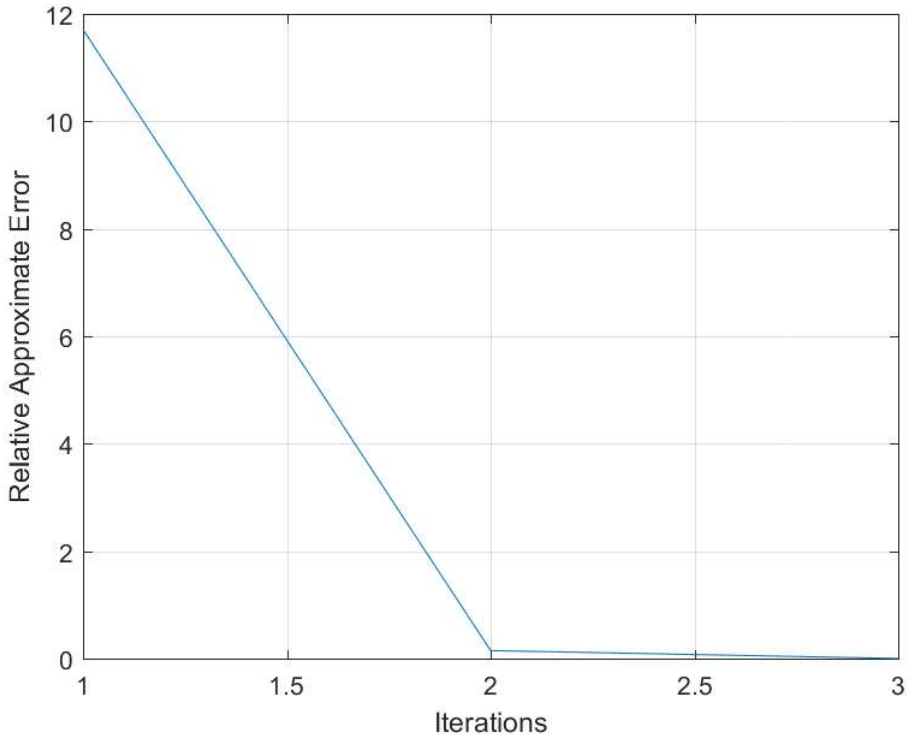
Modified False-Position Method

Solution: 0.999989886106003



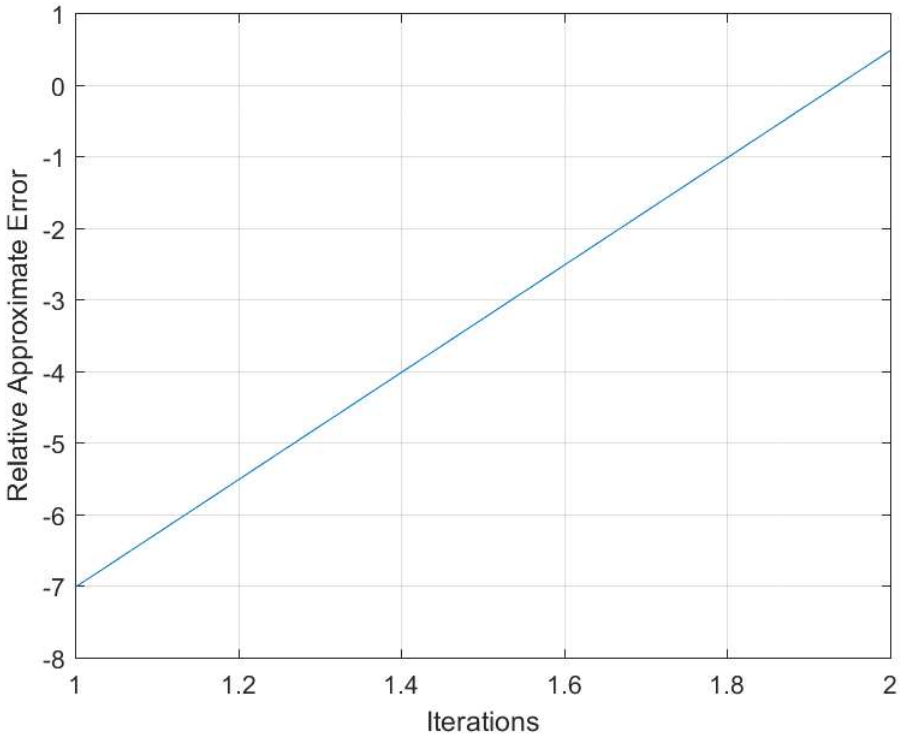
Newton-Raphson Method

Solution: 0.567143290409781



Secant Method

Solution: 0.567143299083762



Convergence and Stability

The order of convergence for the above methods is:

Bisection < Modified False-Position < False-Position < Newton-Raphson Method < Secant

The only unstable method for the function is:

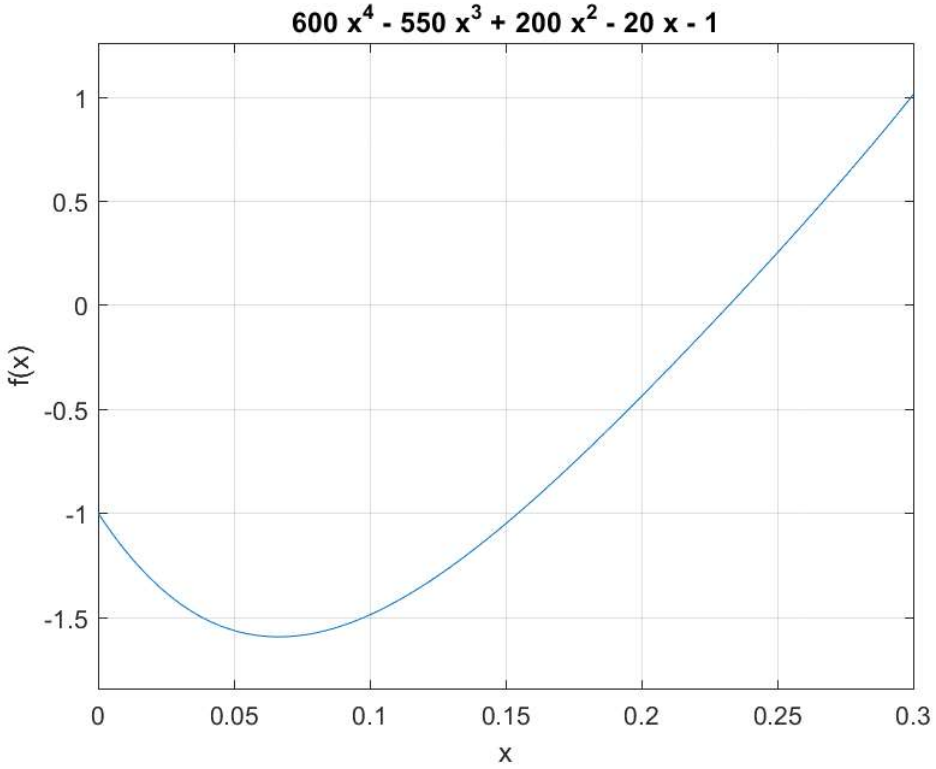
Modified False-Position

2. Muller's and Baistrow's Method

- $f(x) = 600x^4 - 550x^3 + 200x^2 - 20x - 1 = 0$

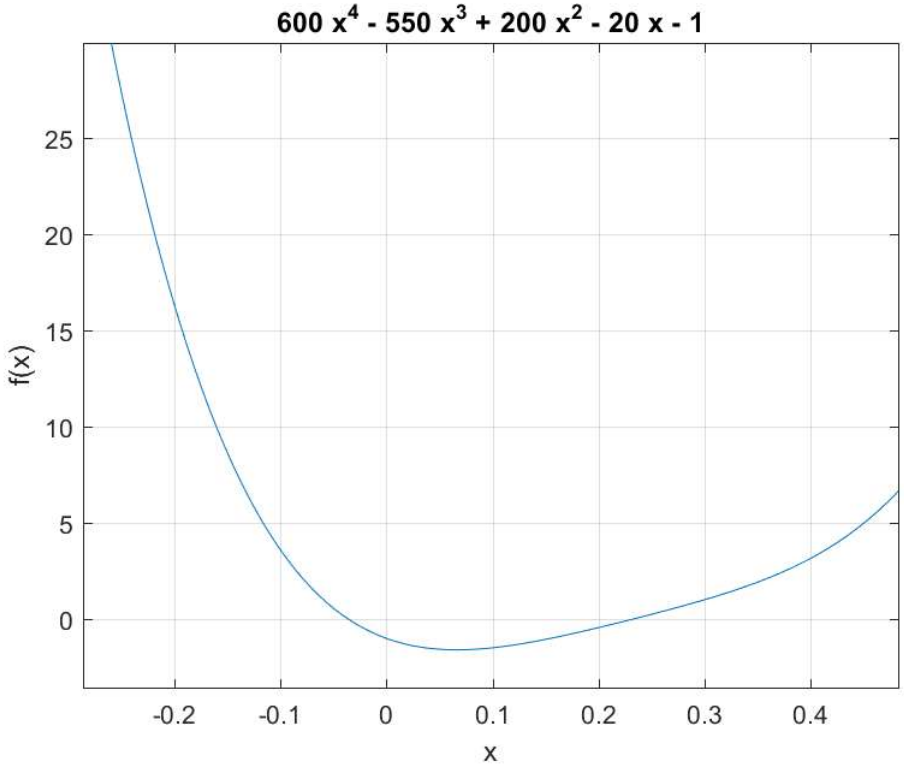
Muller's Method

Solution: 0.232352964760914



Baistrow's Method

Roots: -0.035839691866268 and 0.232352964749917



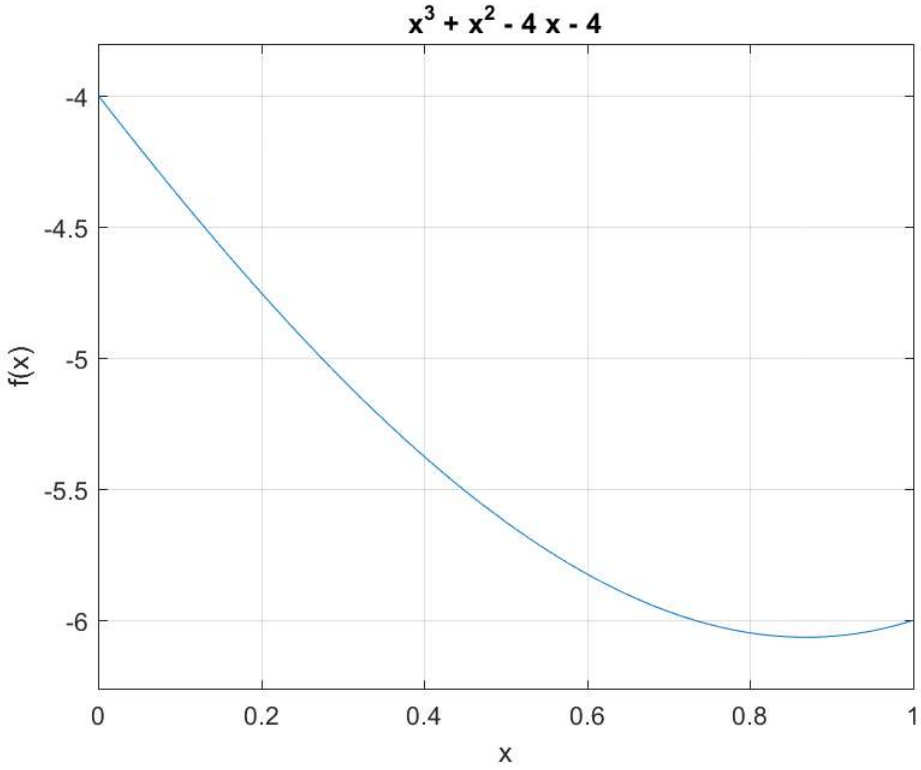
Convergence and Stability

Both the methods converge to the right solution and are quite stable.

- $f(x) = x^3 + x^2 - 4x - 4 = 0$

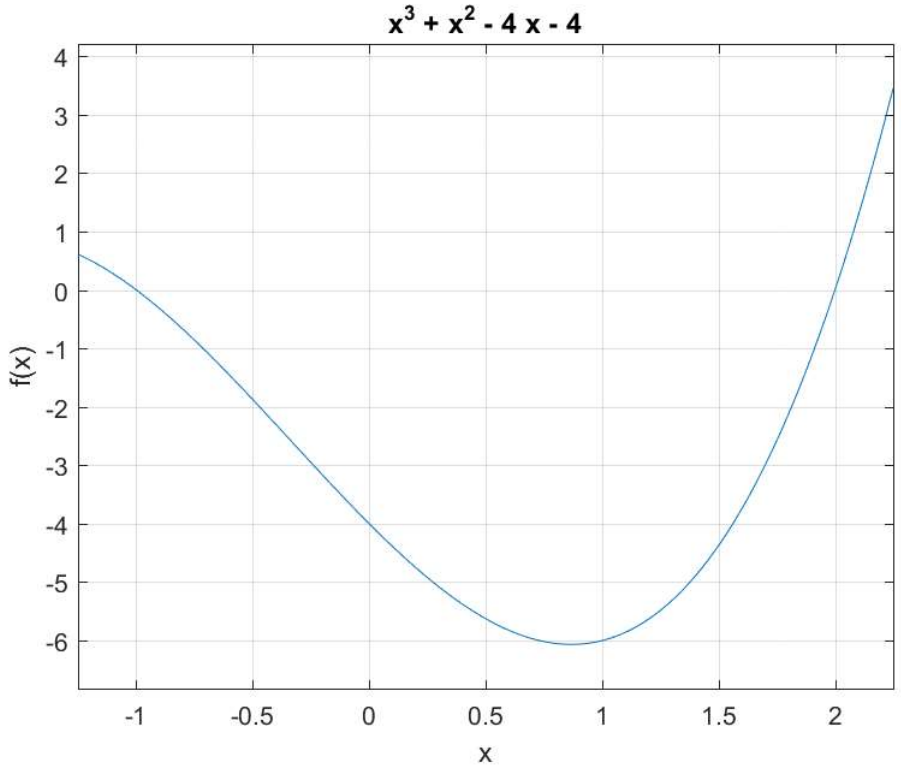
Muller's Method

Solution: 2.00000000005357



Baistrow's Method

Roots: -1 and 2



Convergence and Stability

Both the methods converge to the right solution but the Baistrow method converges faster and is more stable than the Muller's Method