Sample Runs and Analysis.

1- Bisection

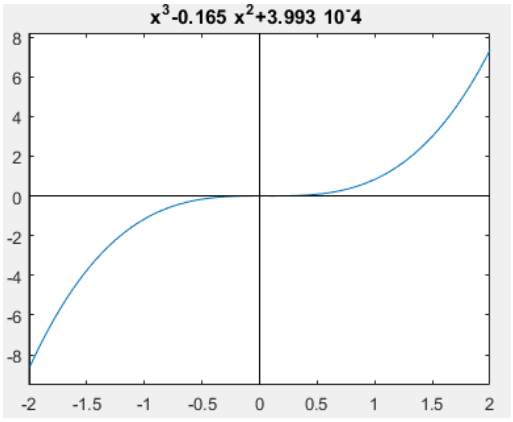
Inputs:

- $x^3 - 0.165 * x^2 + 3.993 * 10^{-4} = 0$
- Initial guesses: $\{0,\ 0.11\}$
- Precision: 0.00001
- Max iterations: 50

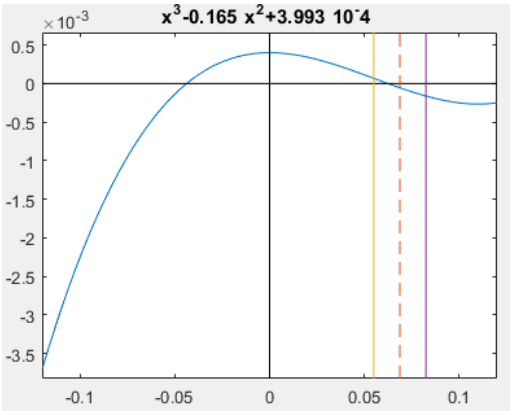
Outputs:

- Root:0.0623785
- Time: 0.18179
- Iterations: 14
- Precision: $-8.54208 * 10^{-9}$
- Theoretical Error = $//add\ the\ error\ here$

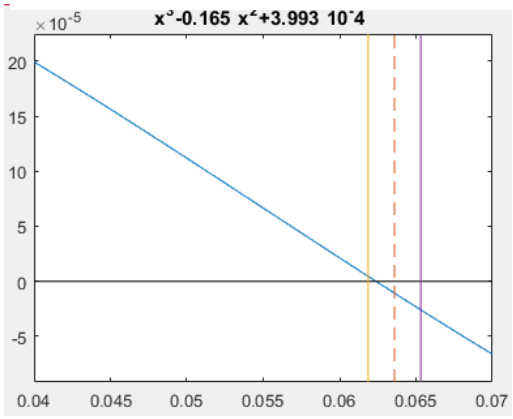
Function plotting & step simulation.



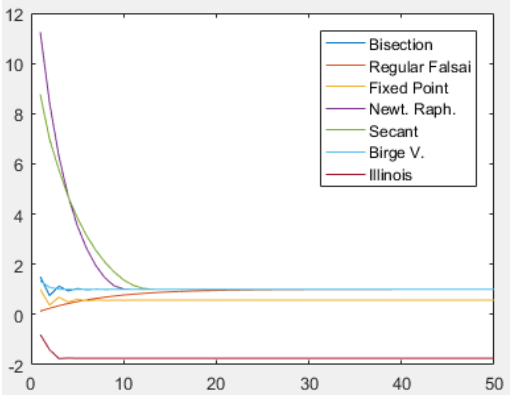
Function plotting



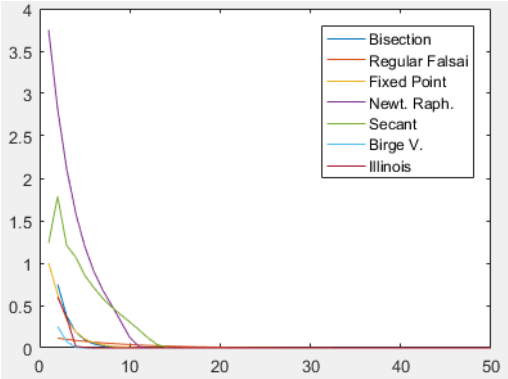
Bisection 3rd iteration



Bisection 6th iteration



Comparison between the obtained root and number of iterations for each method.



Comparison between the relative error and number of iterations for each method.

2- False-Position

- <u>First Test Case</u>

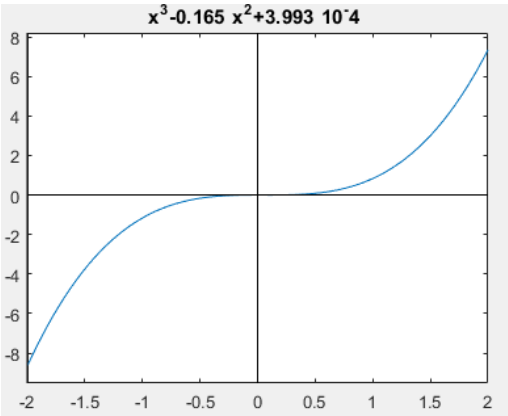
Inputs:

- $x^3 - 0.165 * x^2 + 3.993 * 10^{-4} = 0$
- Initial guesses: $\{0,\ 0.11\}$
- Precision: 0.00001
- Max iterations: 50

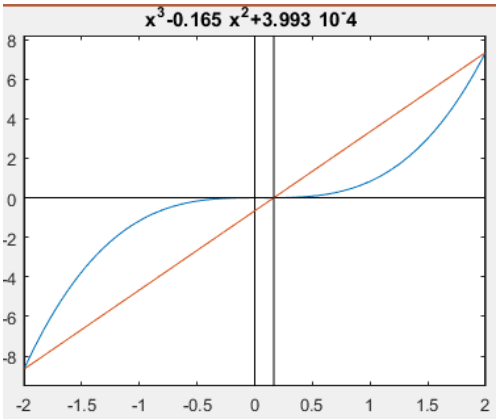
Outputs:

- Root: 0.0623776
- Time: 0.0694955
- Iterations: 5
- Precision: $3.74479 * 10^{-8}$
- Theoretical Error = $//add\ the\ error\ here$

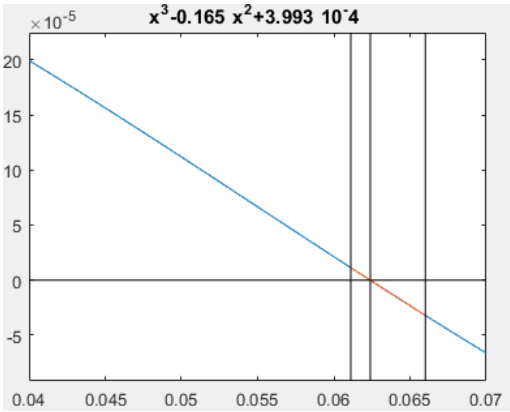
Function plotting & step simulation.



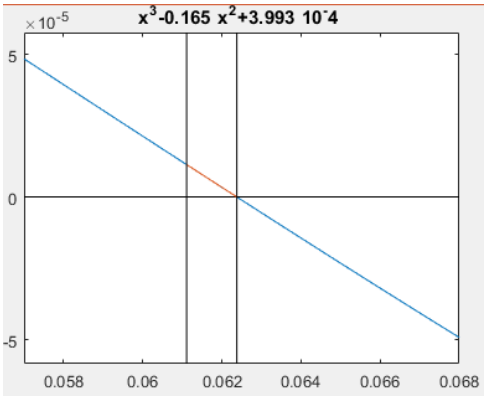
Function plotting



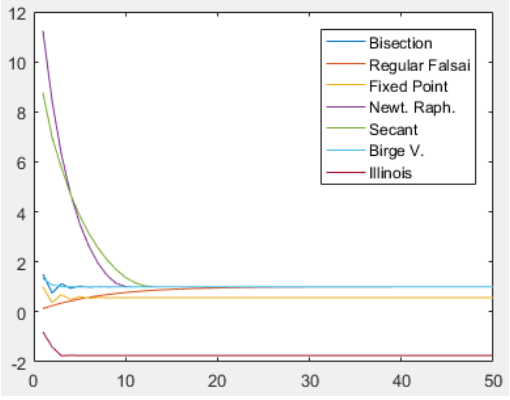
False-Position 1st iteration



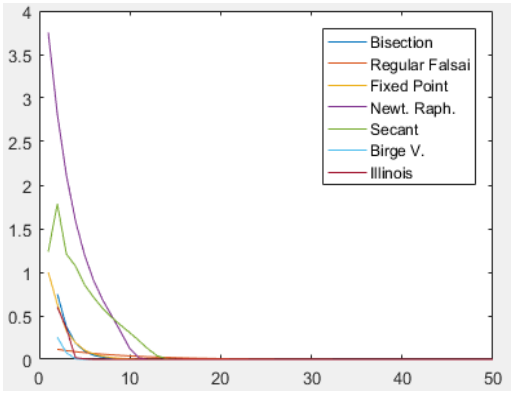
False-Position 3th iteration



False-Position 5th (Last) iteration



Comparison between the obtained root and number of iterations for each method.



Comparison between the relative error and number of iterations for each method.

- Second Test Case

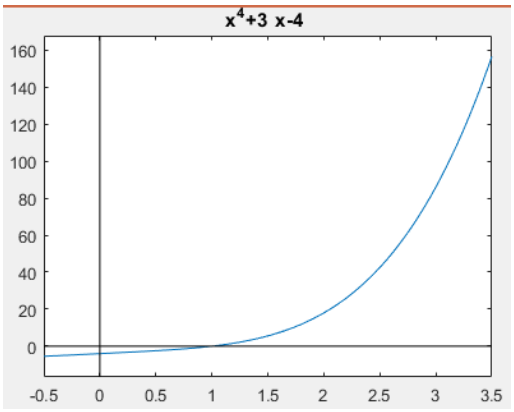
Inputs:

- $x^3 - 0.165 * x^2 + 3.993 * 10^{-4} = 0$
- Initial guesses: $\{0,\ 0.11\}$
- Precision: 0.00001
- Max iterations: 50

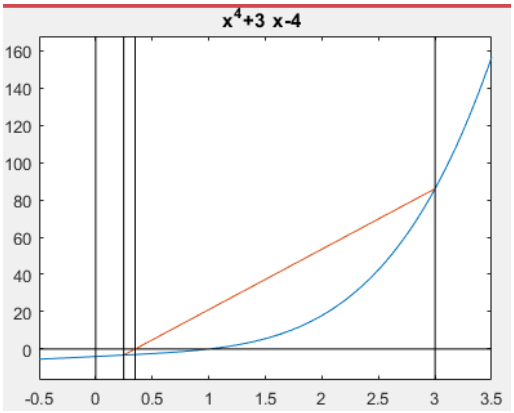
Outputs:

- Root: 0.999793
- Time: 1.94616
- Iterations: 50
- Precision: $4.03109 * 10^{-5}$
- Theoretical Error = $//add\ the\ error\ here$

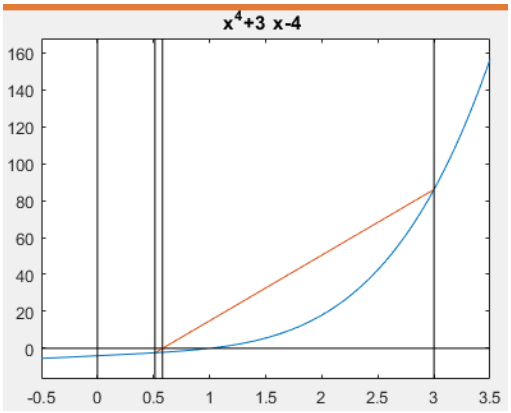
Function plotting & step simulation.



Function plotting

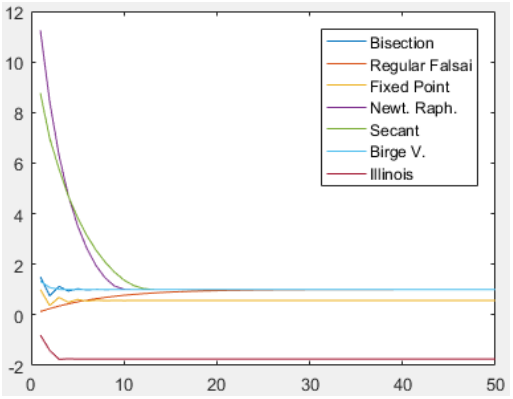


False-Position 3th iteration

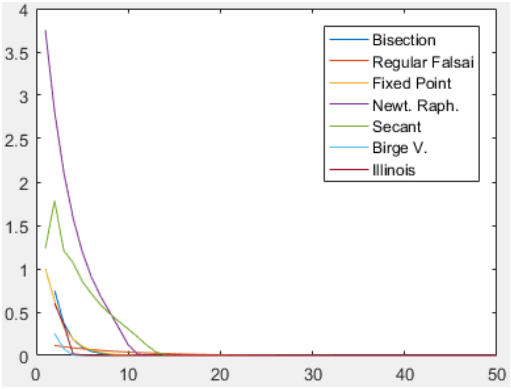


False-Position 6th iteration

Node: The difference between the plot for the 3rd and the 6th is very small because this method is very slow for this test case.



Comparison between the obtained root and number of iterations for each method.



Comparison between the relative error and number of iterations for each method

3- Fixed Point

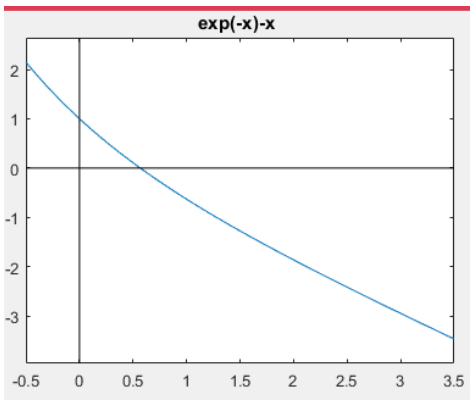
Inputs:

- $e^{-x} - x = 0$
- Initial guesses: $\{0\}$
- $G(x) = e^{-x}$
- Precision: 0.00001
- Max iterations: 50

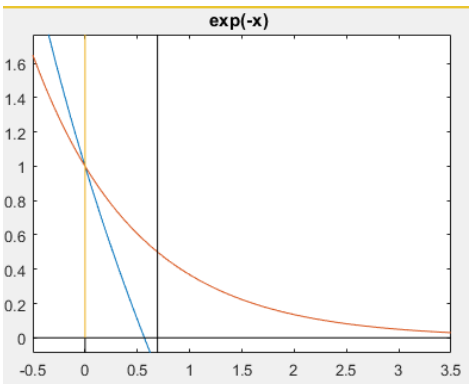
Outputs:

- Root: 0.567141
- Time: 1.95749
- Iterations: 22
- Precision: $3.3189 * 10^{-6}$
- Theoretical Error = $//add\ the\ error\ here$

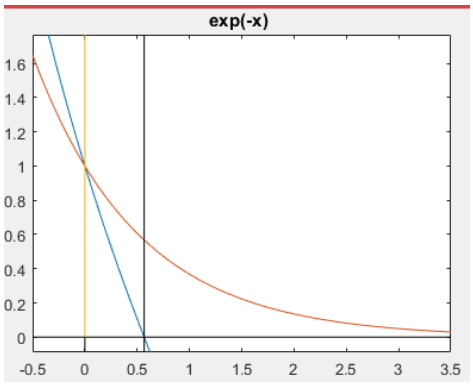
Function plotting & step simulation.



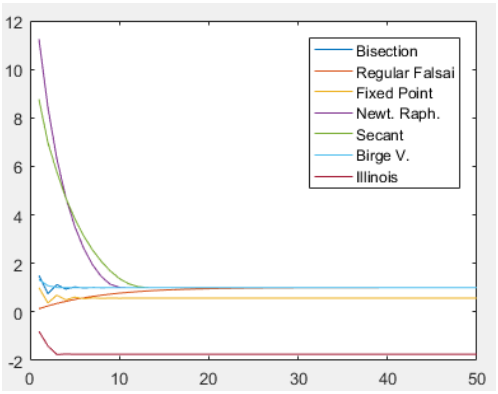
Function Plotting



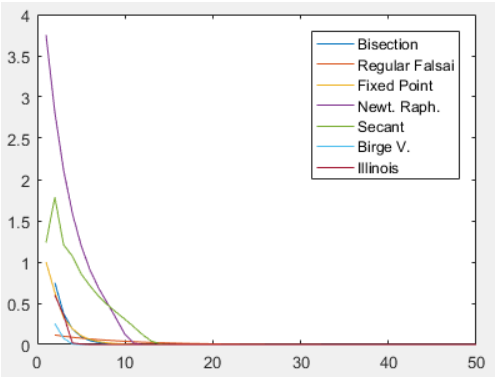
3rd iteration plotting



12th iteration plotting



Comparison between the obtained root and number of iterations for each method.



Comparison between the relative error and number of iterations for each method

4- Newton-Raphson

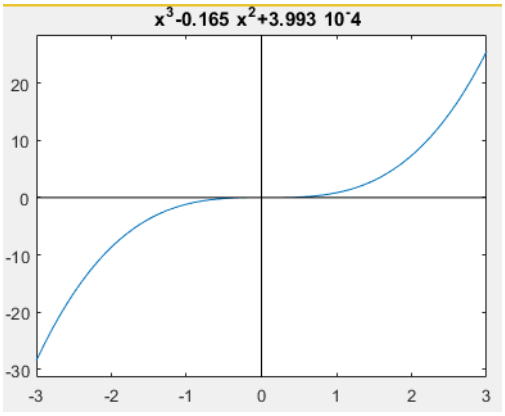
Inputs:

- Input equation: $x^3 - 0.165 * x^2 + 3.993 * 10^{-4} = 0$
- Initial guesses: $\{0.05\}$
- Precision: 0.00001
- Max iterations: 50

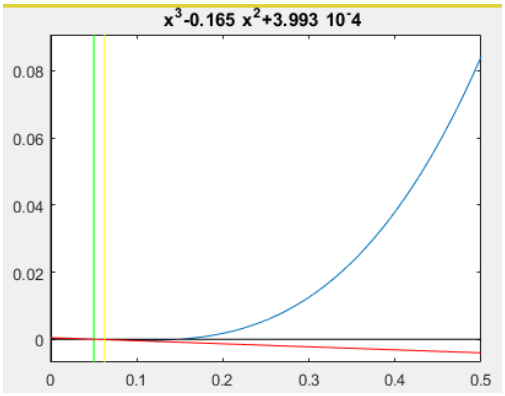
Outputs:

- Root: 0.0623776
- Time: 0.0633101
- Iterations: 3
- Precision: $5.24341 * 10^{-19}$
- Theoretical Error = $//add\ the\ error\ here$

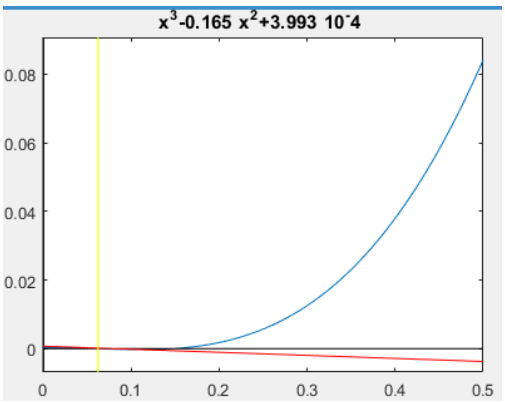
Function plotting & step simulation.



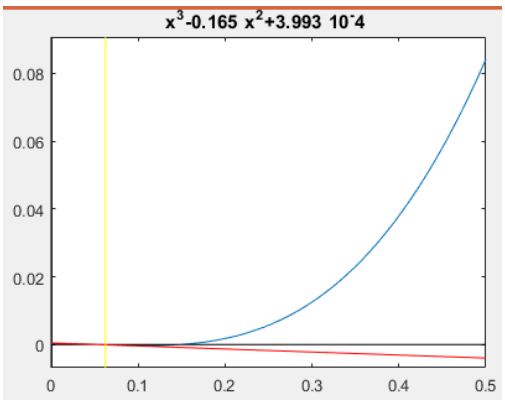
Function plotting



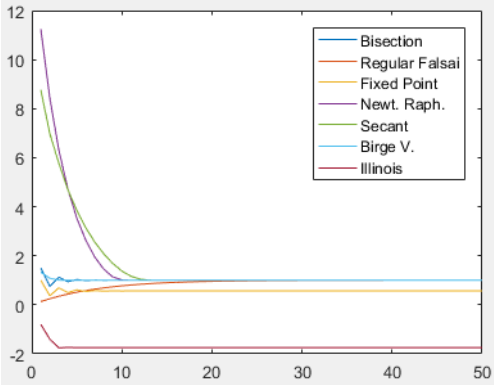
First iteration



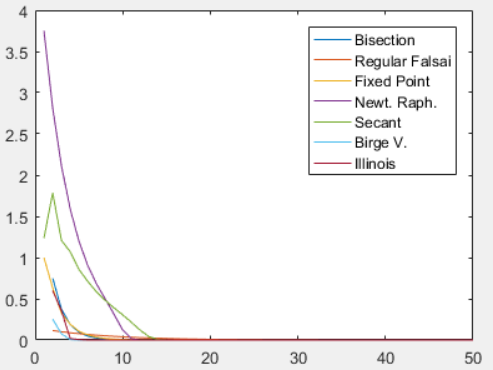
Second iteration



Third (last) iteration



Comparison between the obtained root and number of iterations for each method.



Comparison between the relative error and number of iterations for each method

5- Secant Method

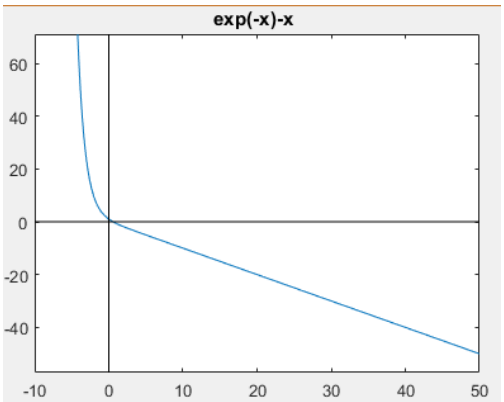
Inputs:

- Input equation: $e^{-x} - x = 0$
- Initial guesses: $\{0,\ 1\}$
- Precision: 0.00001
- Max iterations: 50

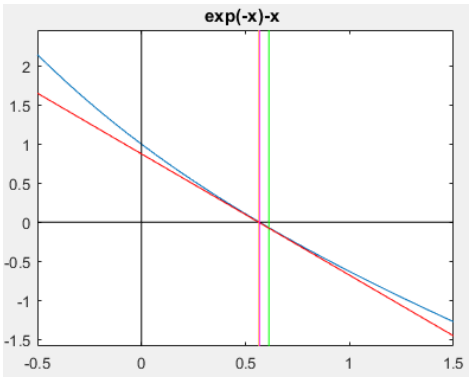
Outputs:

- Root: 0.567143
- Time: 0.609435
- Iterations: 4
- Precision: $-2.53802 * 10^{-8}$
- Theoretical Error = $//add\ the\ error\ here$

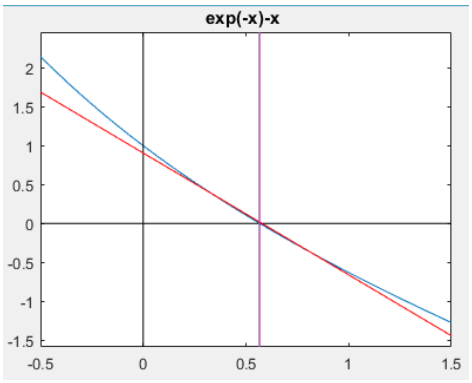
Function plotting & step simulation.



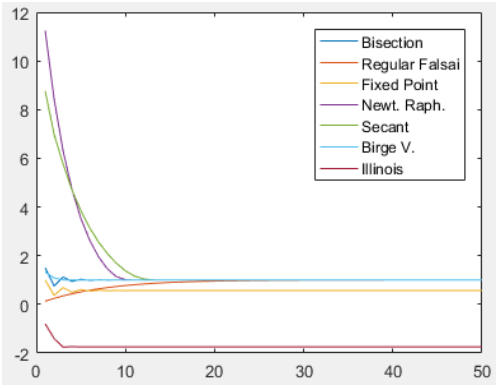
Function plotting



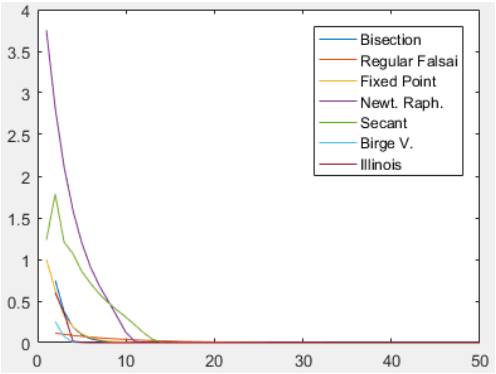
3rd iteration plotting



4rd (Last) iteration plotting



Comparison between the obtained root and number of iterations for each method.



Comparison between the relative error and number of iterations for each method