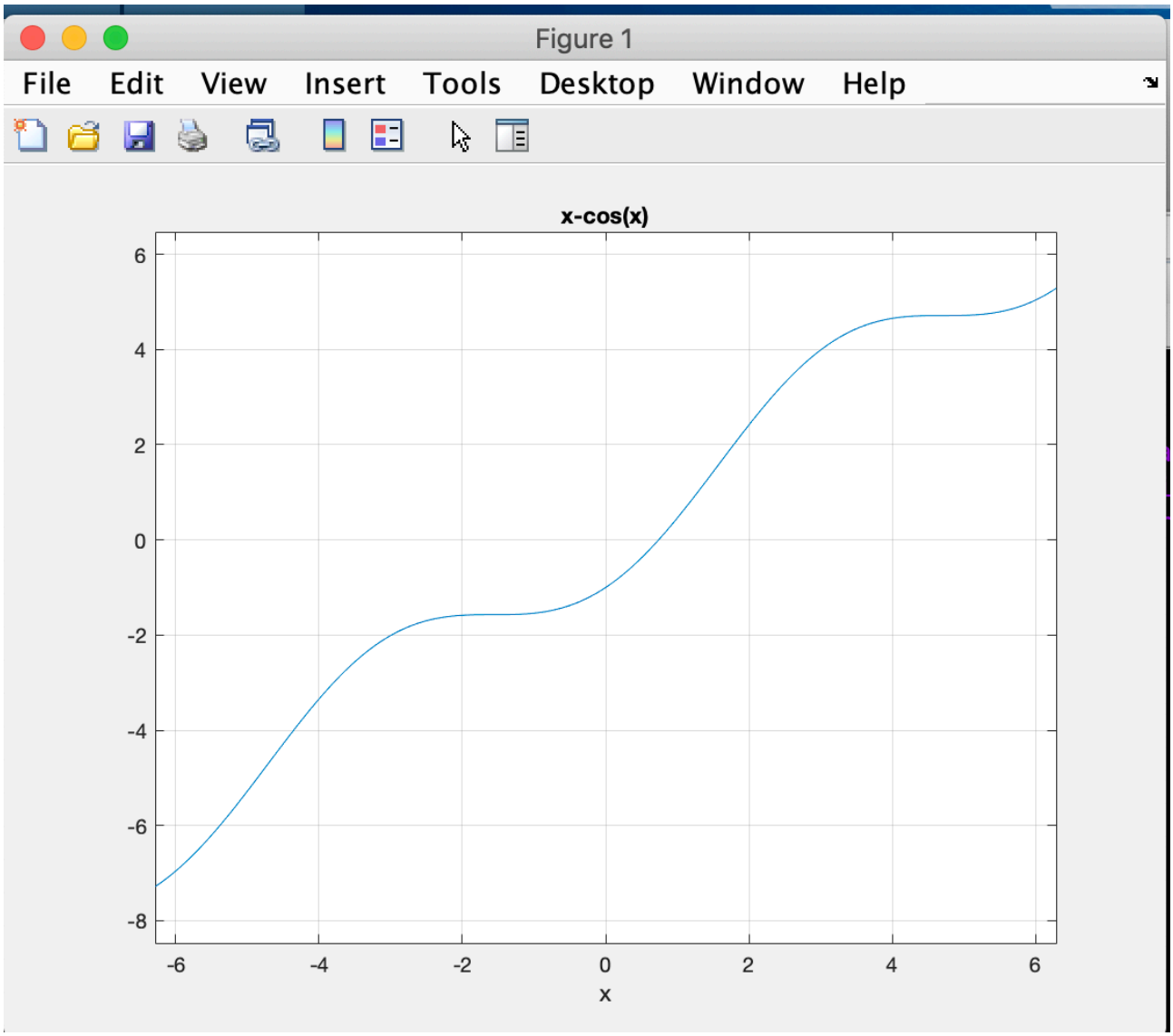
$f(x) = x - \cos x$

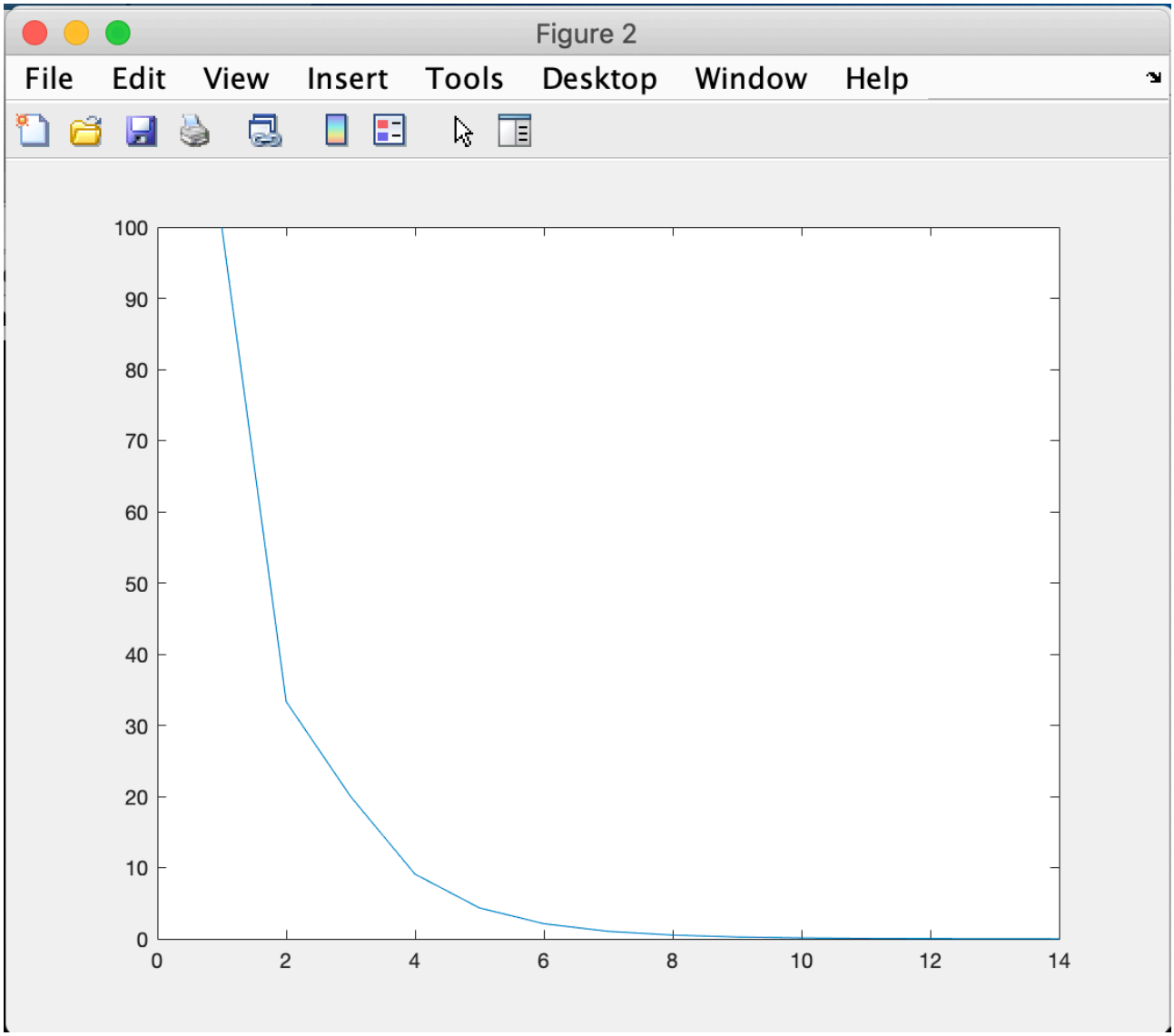
1.) BISECTION:

programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: Bisection
Enter a function: x-cos(x)
Enter x1: 0
Enter x2: 1
What would you like as the maximum relative approximate error(number you enter will be taken as percentage): 0.01
What would you like as the convergence criterion for function value(number you enter will be taken as percentage): 0.0001
What should be the maximum iteration number the program should run: 50
Convergence criterion for maximum relative error is met
The root of the function: 0.739075

Graph of f(x) vs x:



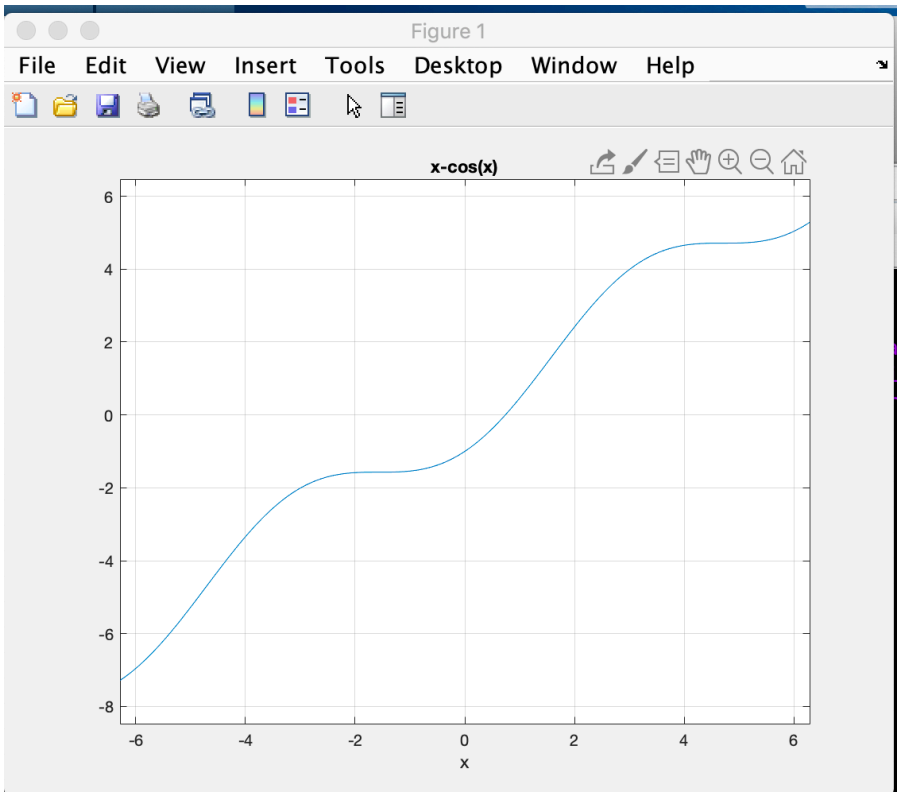
Graph of approximate relative error vs iteration number:



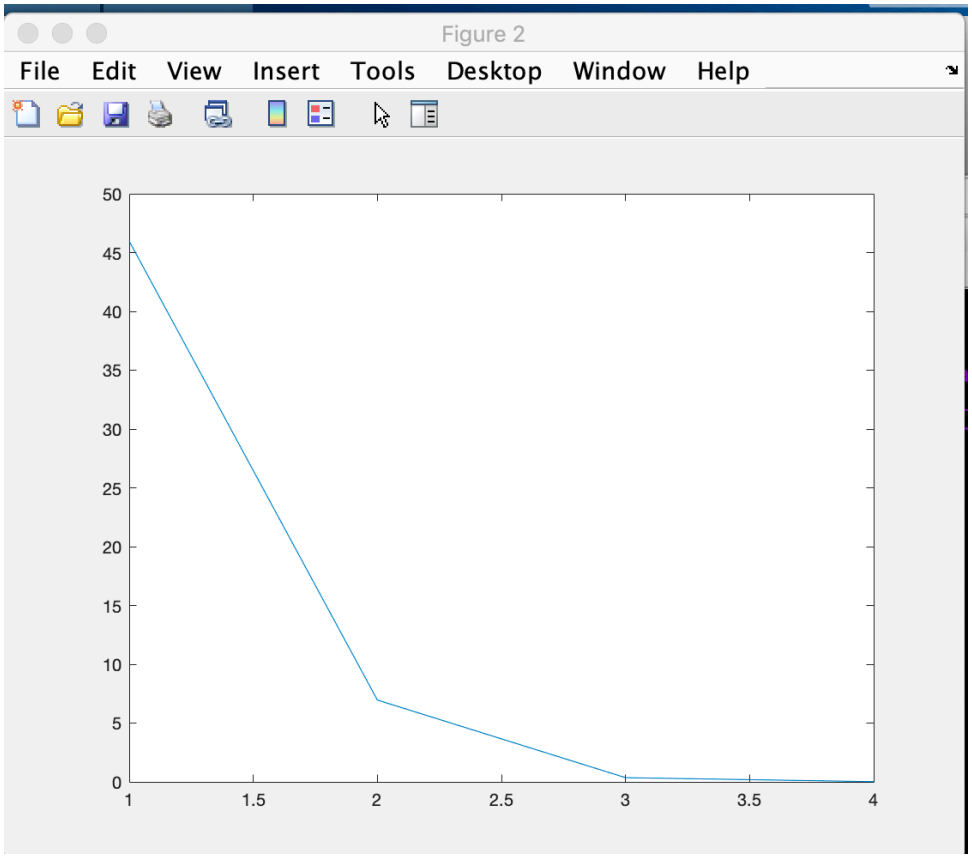
2 FALSE POSITION:

```
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: False-position
Enter a function: x-cos(x)
Enter x1: 0
Enter x2: 1
Enter relative error limit: 0.01
Enter function value limit: 0.0001
Enter iteration number limit: 50
Convergence criterion for function value is met
The root of the function: 0.739085
>>
```

Graph of f(x) vs x:



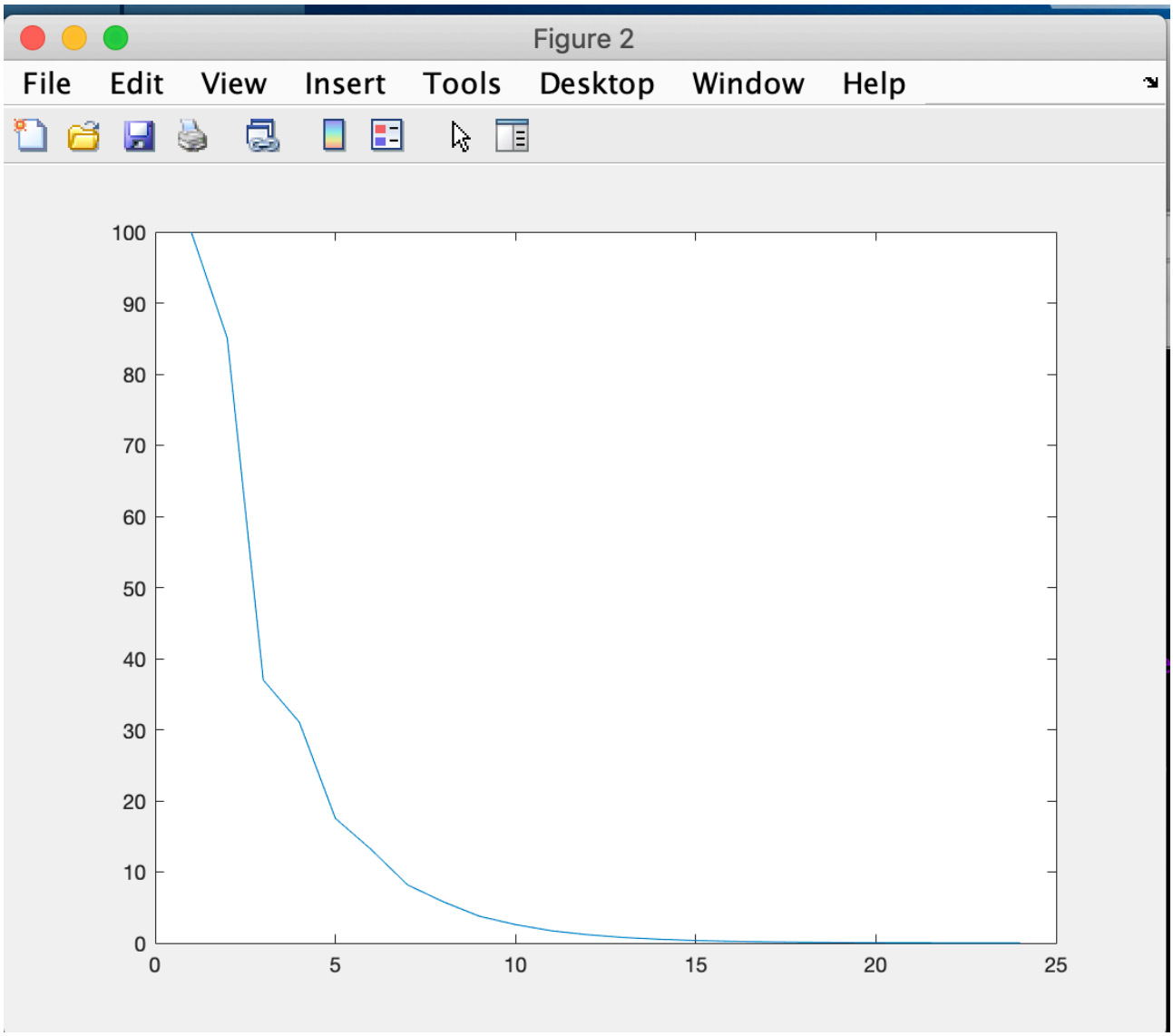
Graph of approximate relative error vs iteration number:



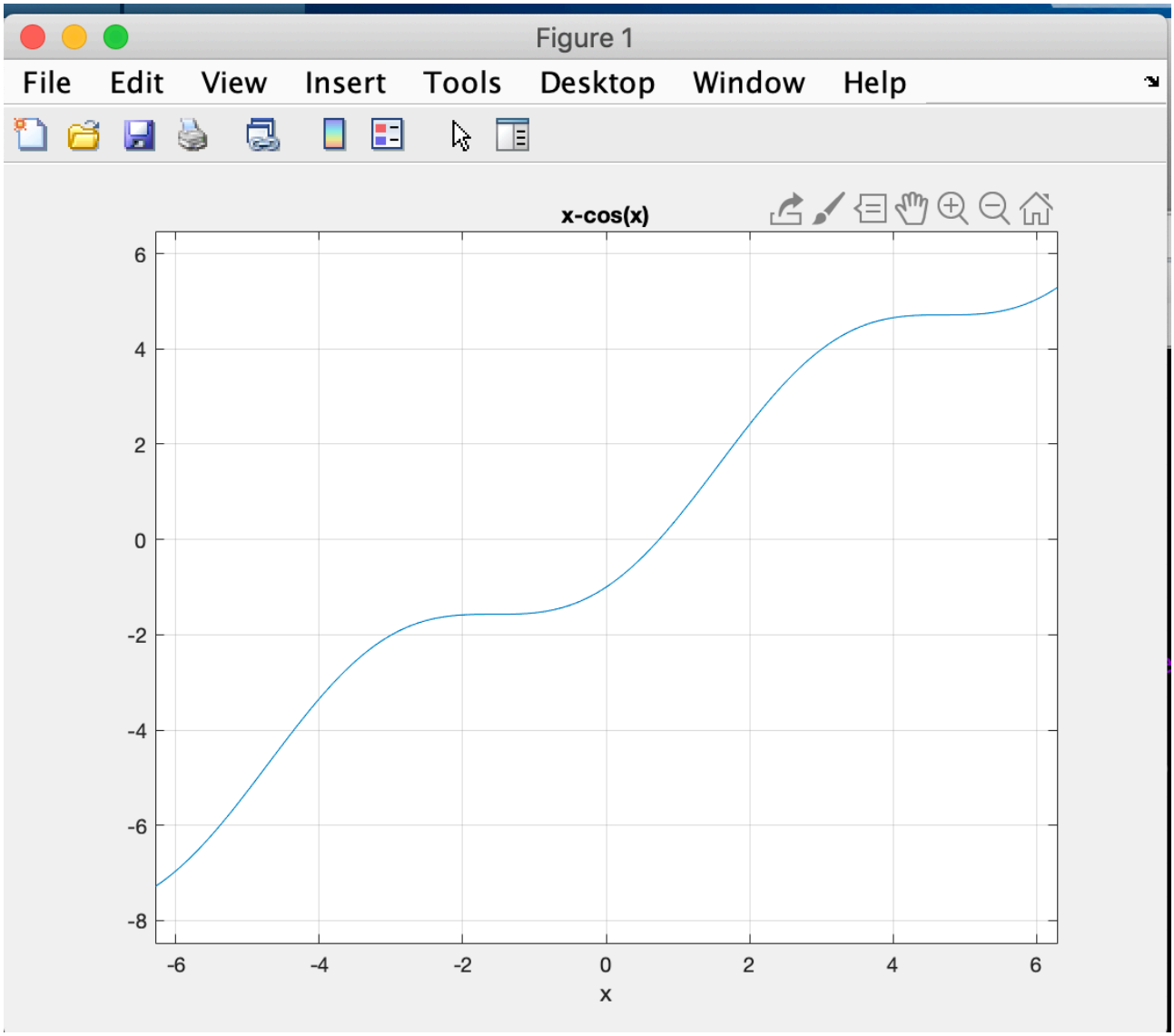
3.) FIXED-POINT:

```
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: Fixed-point
Enter a function g(x): cos(x)
Enter a function f(x): x-cos(x)
Enter x1: 0
Enter relative error limit: 0.01
Enter function value limit: 0.00001
Enter iteration number limit: 50
Convergence criterion for maximum relative error is met
The root of the function: 0.739106
>>
```

Graph of f(x) vs x:

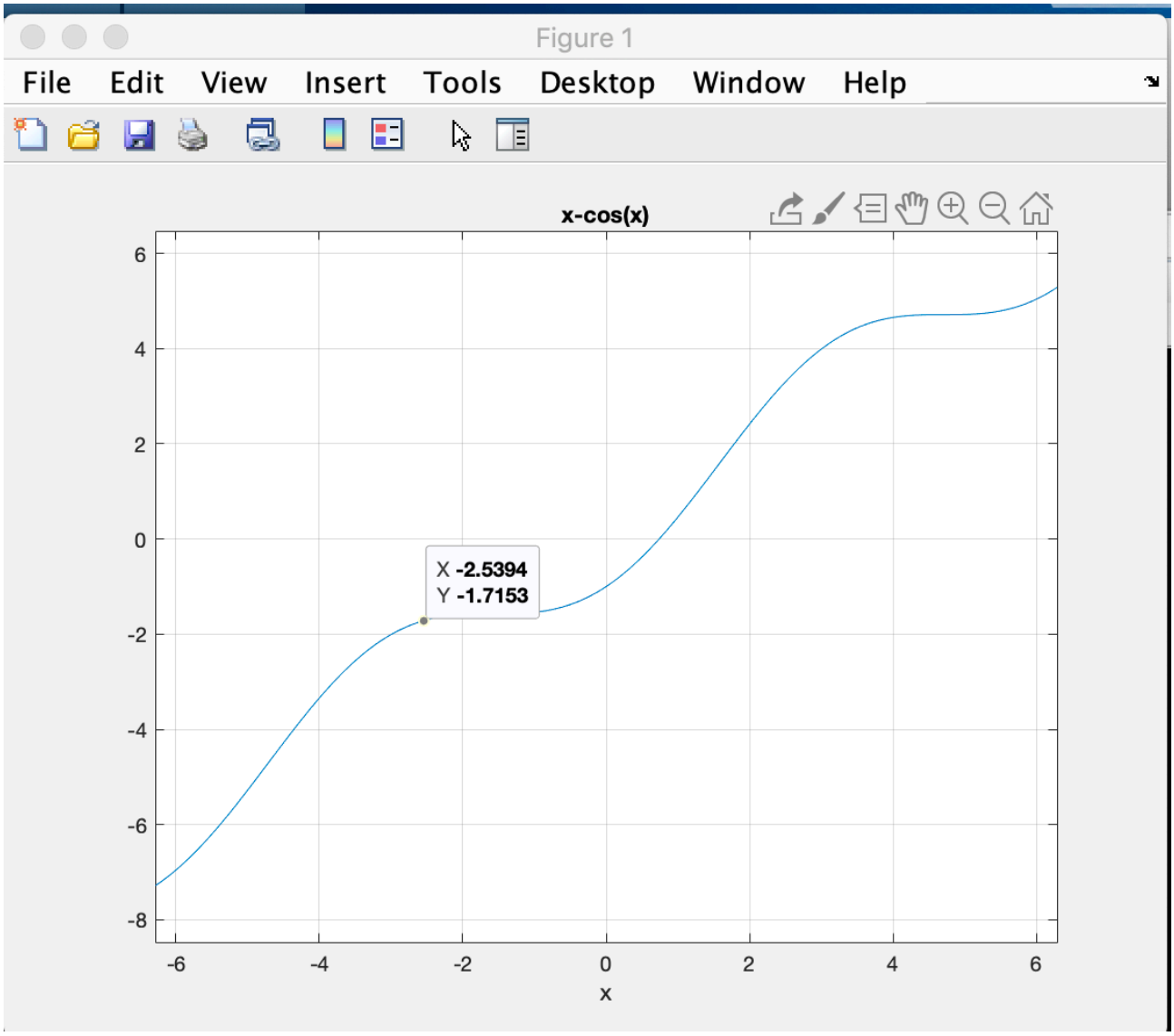


Graph of approximate relative error vs iteration number:

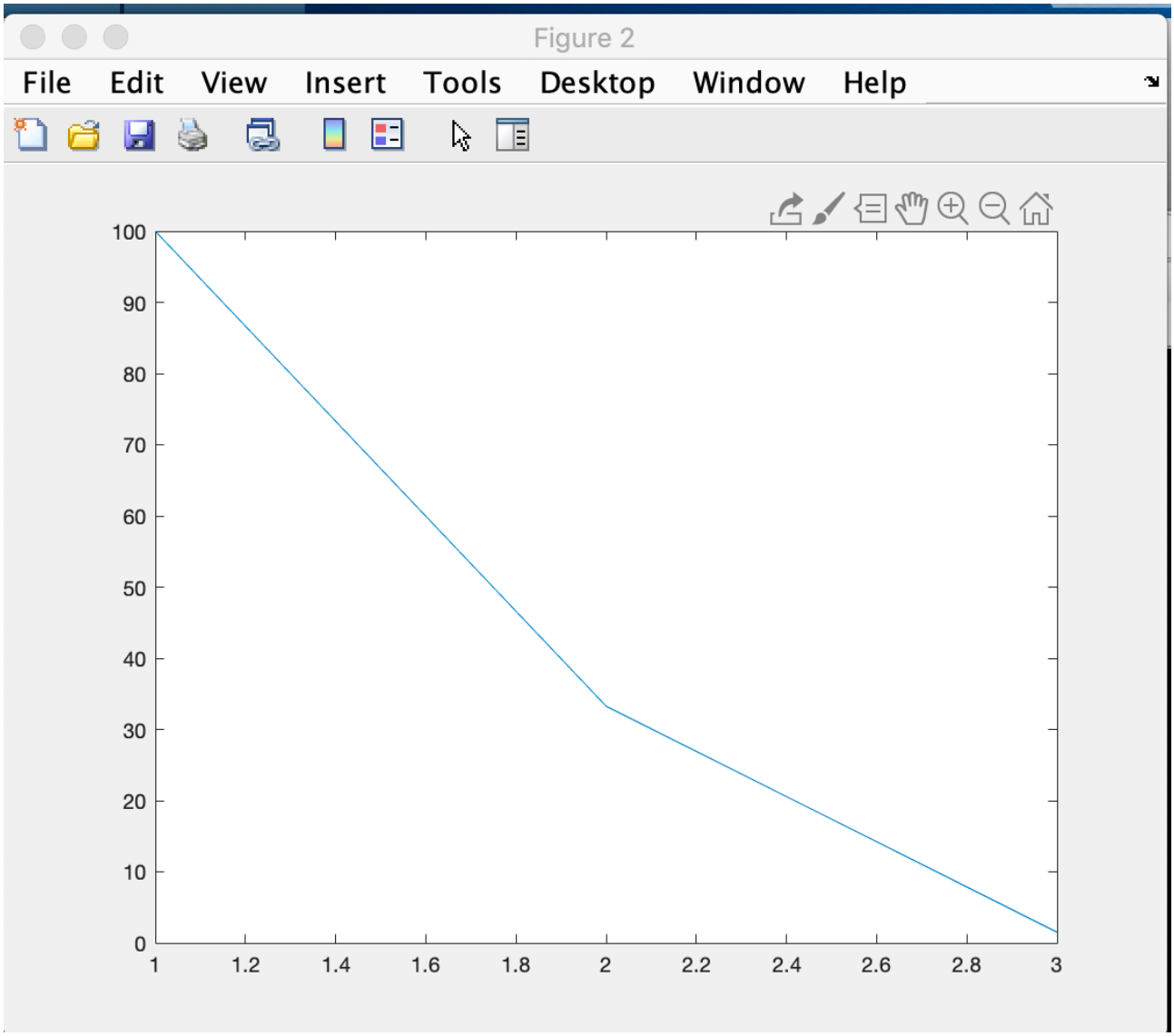


4.) NEWTON RAPHSON:
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: Newton-Raphson
Enter a function: x-cos(x)
Enter x1: 0
Enter relative error limit: 0.01
Enter function value limit: 0.000001
Enter iteration number limit: 50
Convergence criterion for function value is met
The root of the function: 0.739085
>>

Graph of f(x) vs x:

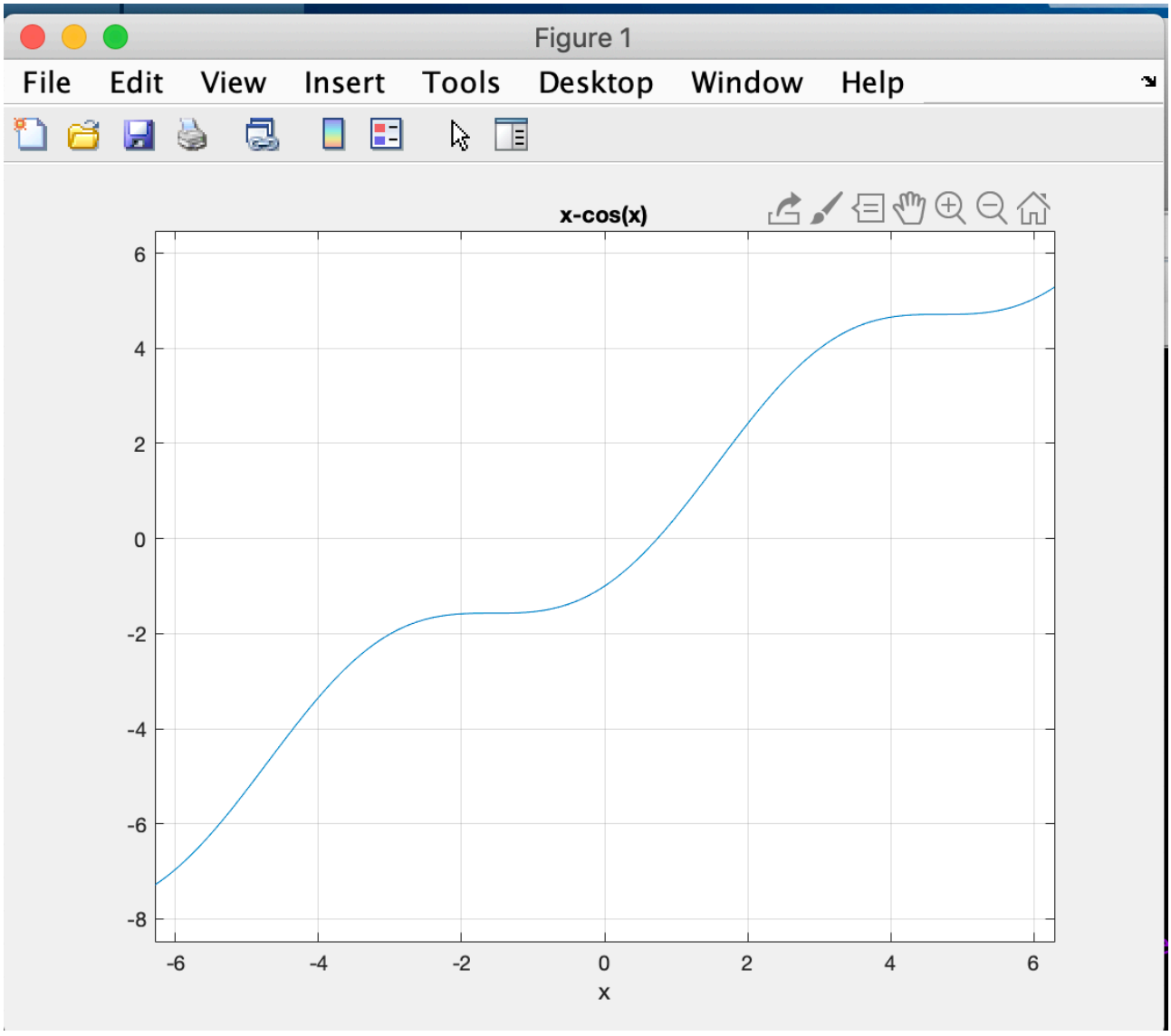


Graph of approximate relative error vs iteration number:

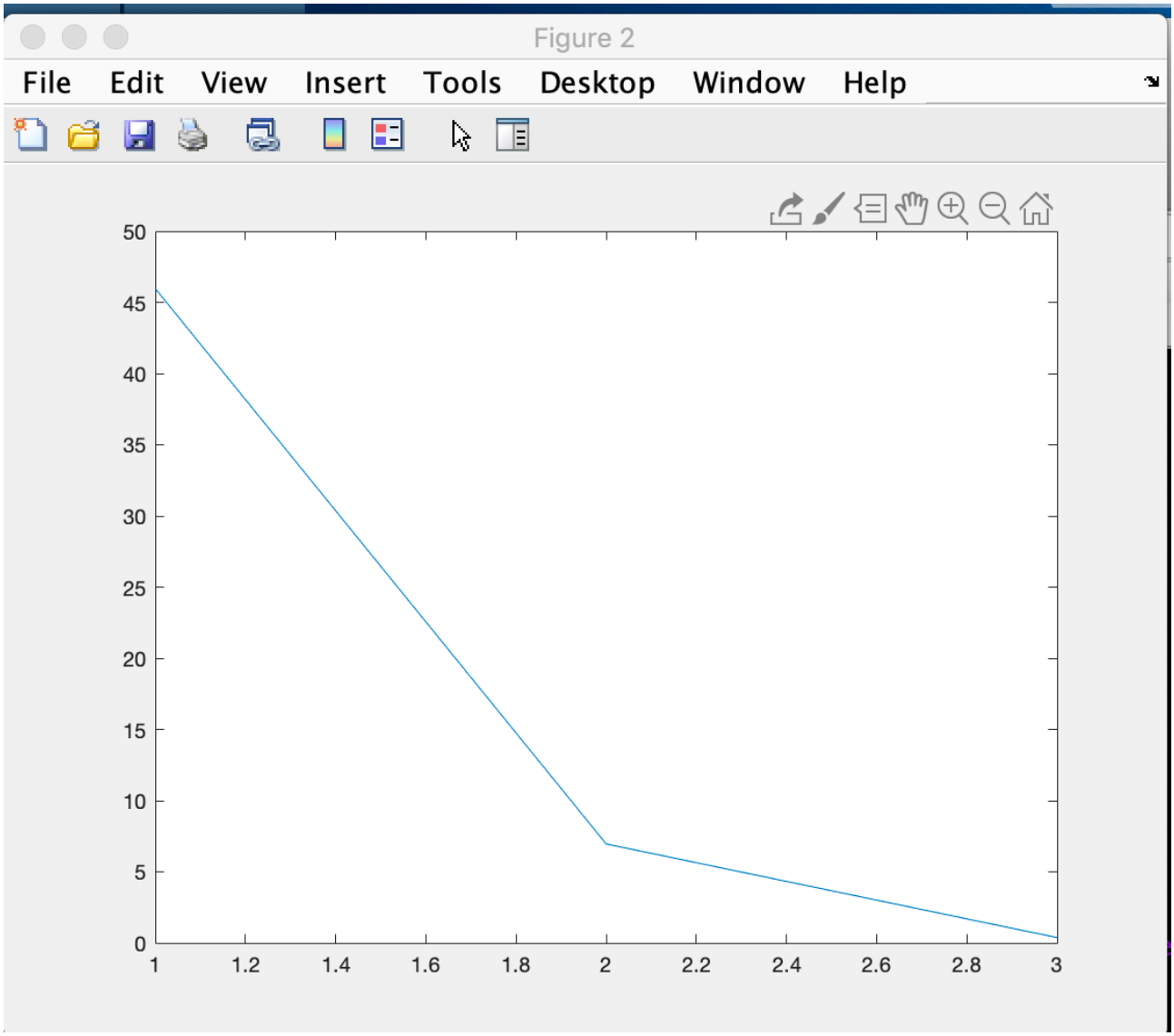


5.) SECANT:
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: Secant
Enter a function: x-cos(x)
Enter x1: 0
Enter x2: 1
Enter relative error limit: 0.01
Enter function value limit: 0.00001
Enter iteration number limit: 50
Convergence criterion for function value is met
The root of the function: 0.739085
>>

Graph of f(x) vs x:



Graph of approximate relative error vs iteration number:

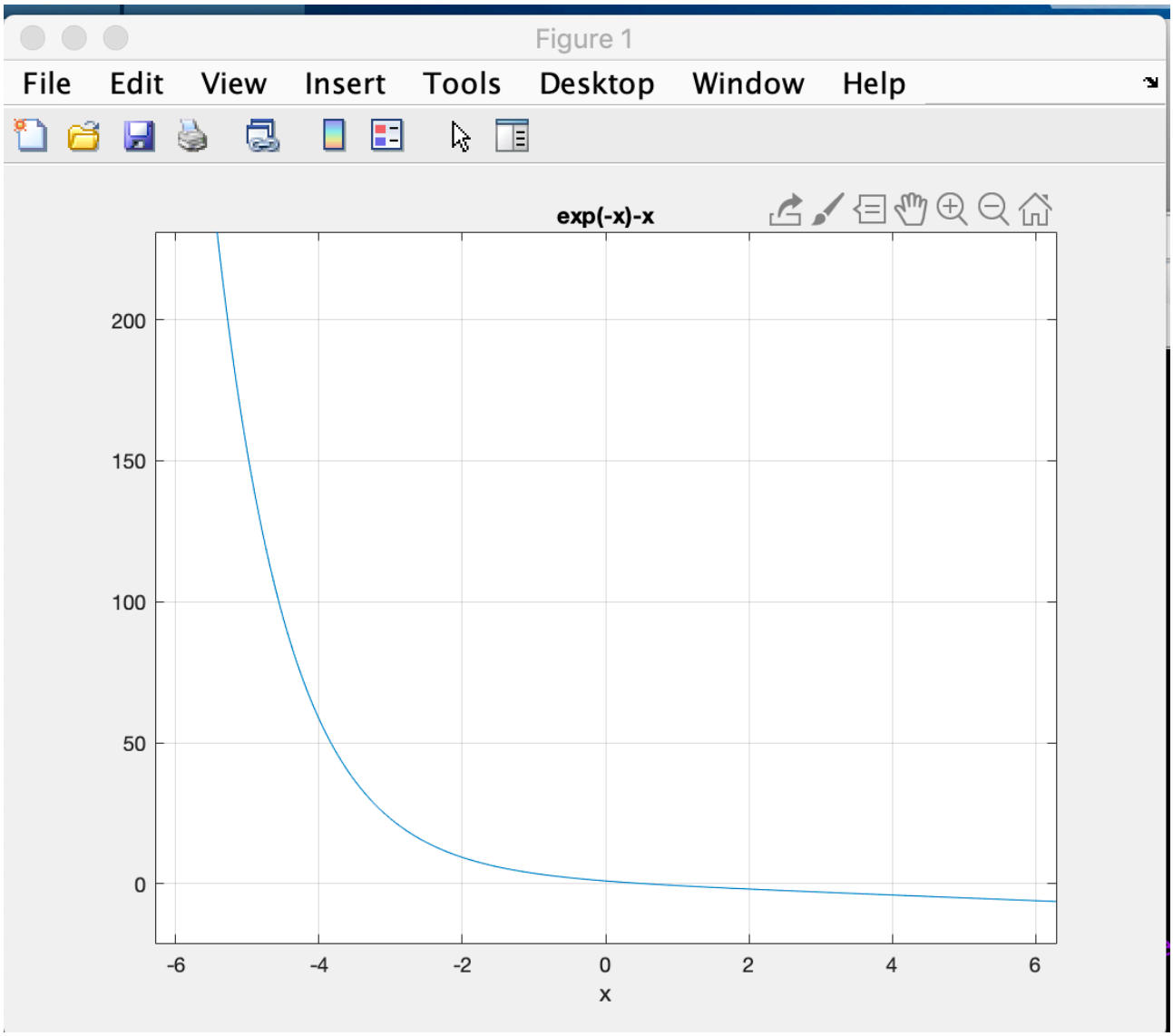


f(x) = exp(-x) - x

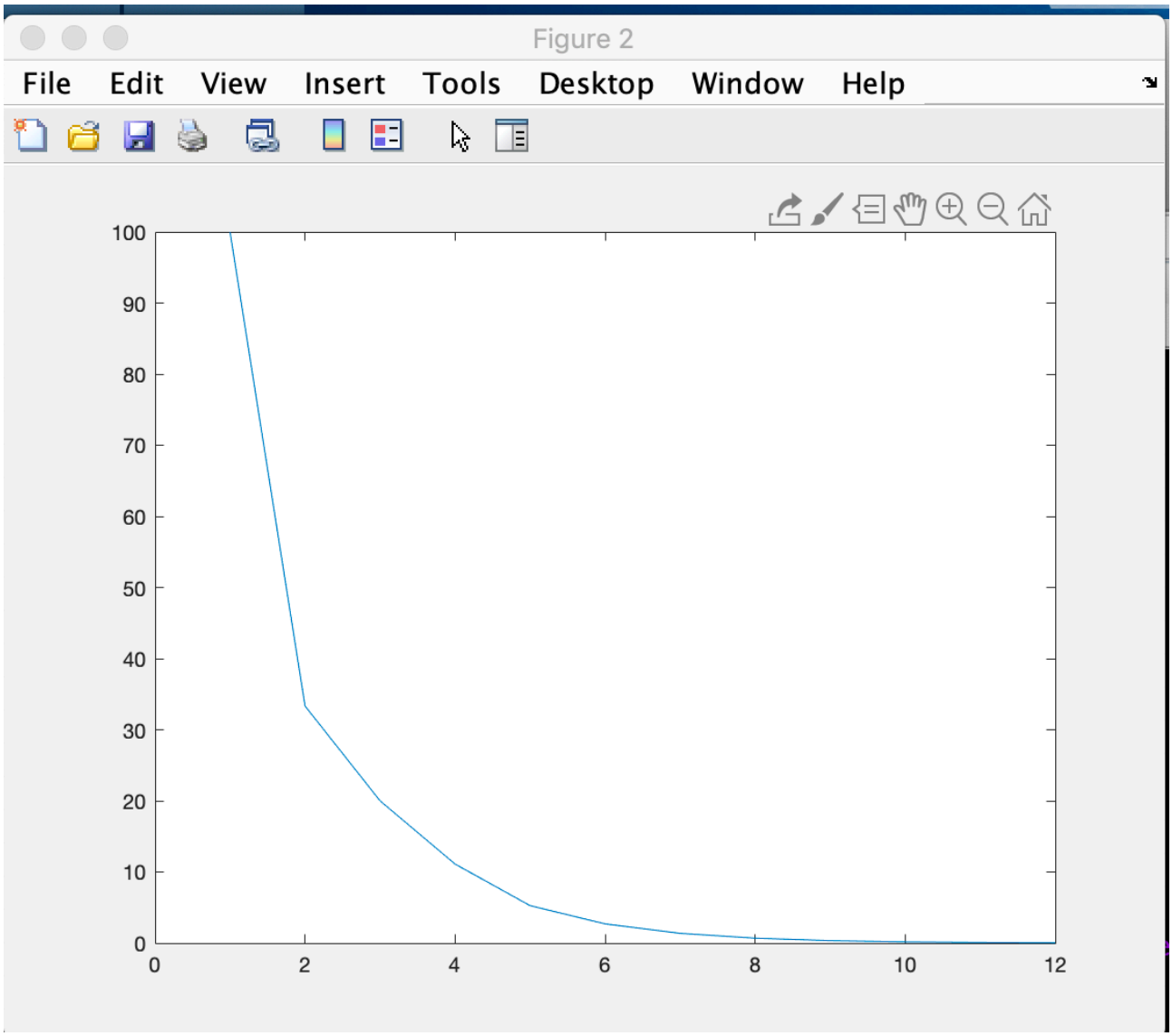
1.) BISECTION:

```
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: Bisection
Enter a function: exp(-x)-x
Enter x1: 0
Enter x2: 1
What would you like as the maximum relative approximate error(number you enter will be taken as percentage): 0.05
What would you like as the convergence criterion for function value(number you enter will be taken as percentage): 0.0001
What should be the maximum iteration number the program should run: 50
Convergence criterion for maximum relative error is met
The root of the function: 0.567139
>>
```

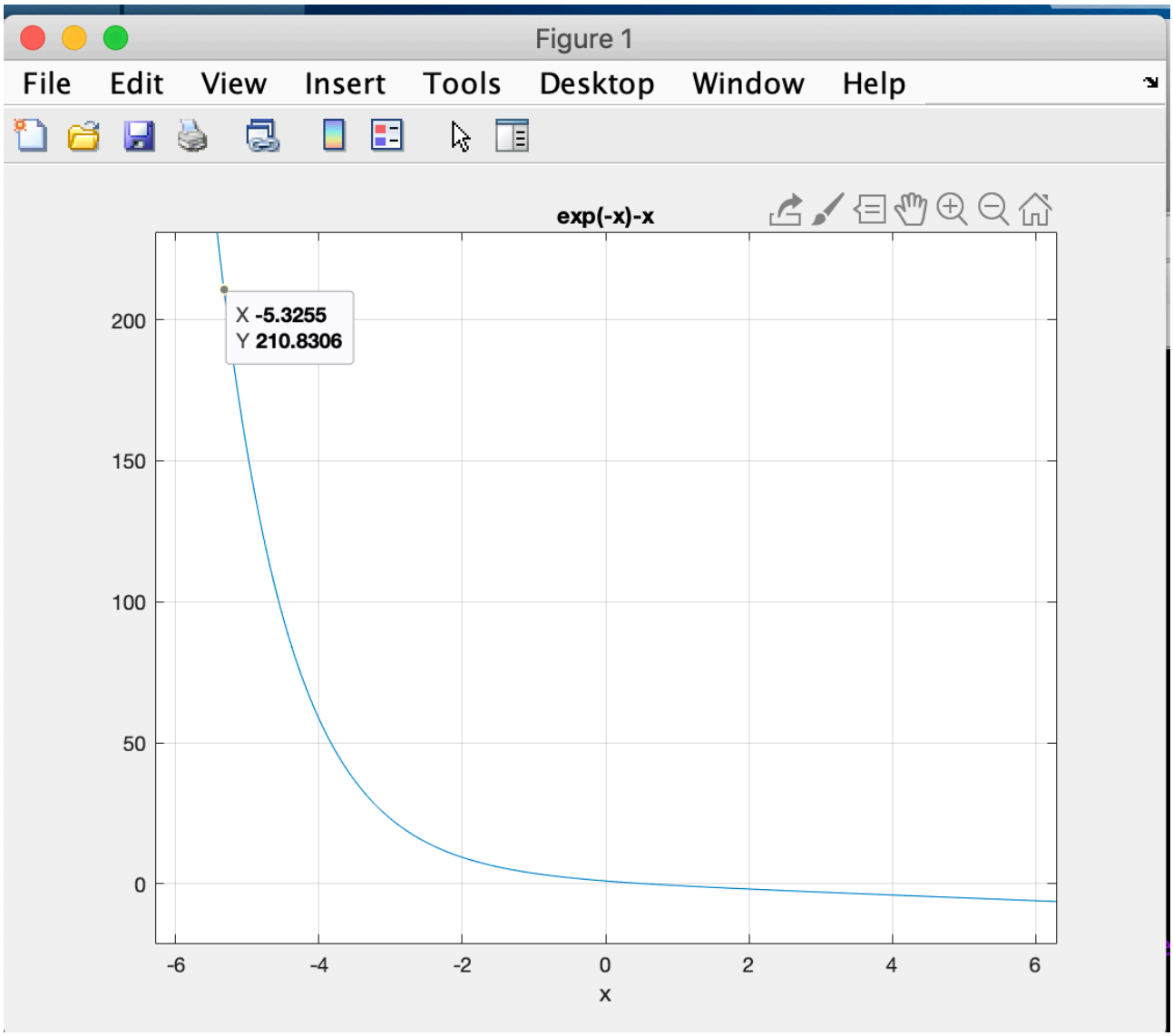
Graph of f(x) vs x:



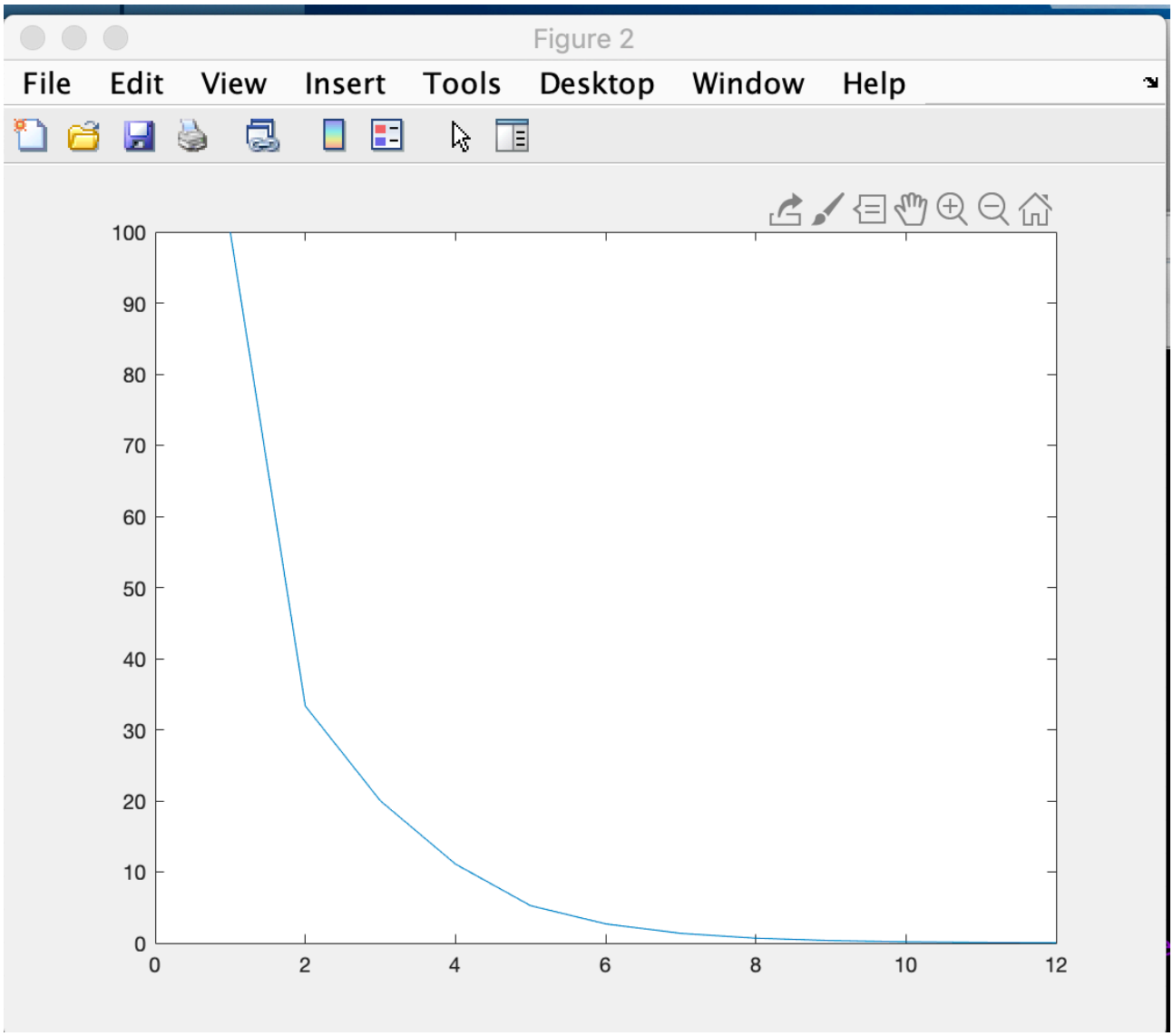
Graph of approximate relative error vs iteration number:



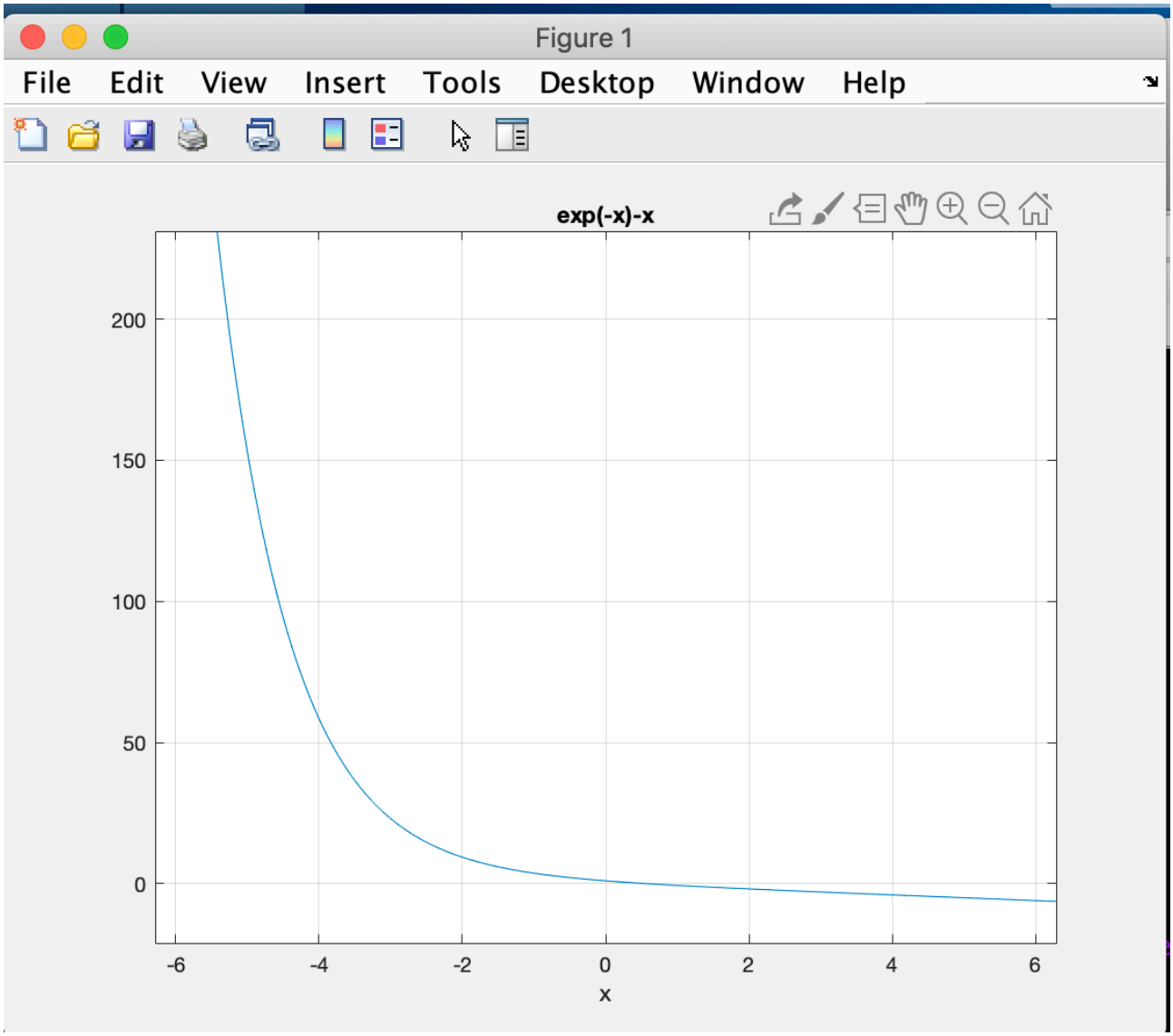
2.) FALSE POSITION:
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: False-position
Enter a function: exp(-x)-x
Enter x1: 0
Enter x2: 1
Enter relative error limit: 0.05
Enter function value limit: 0.0001
Enter iteration number limit: 50
Convergence criterion for maximum relative error is met
The root of the function: 0.567150
>>
Graph of f(x) vs x:



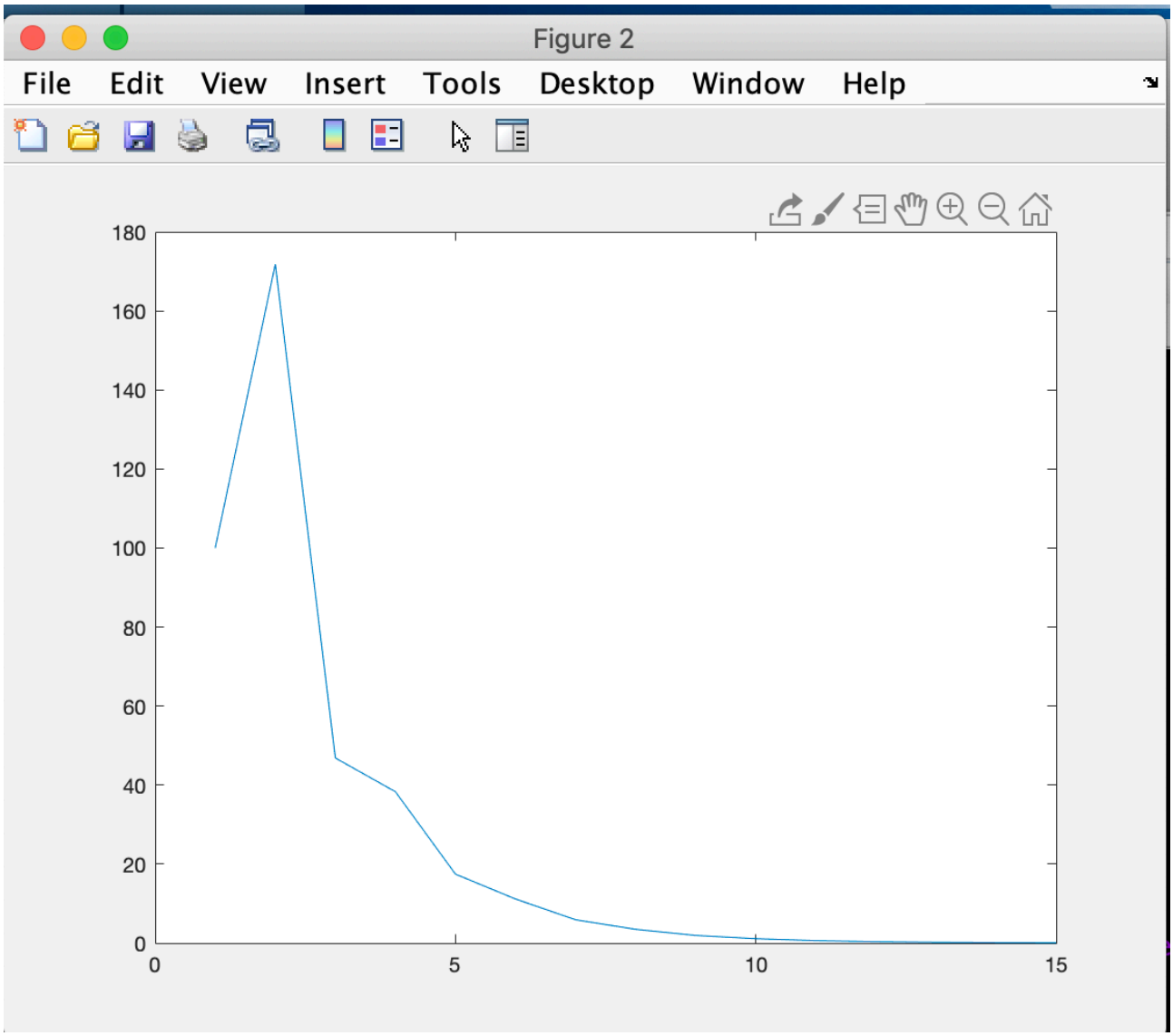
Graph of approximate relative error vs iteration number:



3.)FIXED POINT:
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: Fixed-point
Enter a function g(x): exp(-x)
Enter a function f(x): exp(-x)-x
Enter x1: 0
Enter relative error limit: 0.05
Enter function value limit: 0.0001
Enter iteration number limit: 50
Convergence criterion for maximum relative error is met
The root of the function: 0.567068
>>
Graph of f(x) vs x:



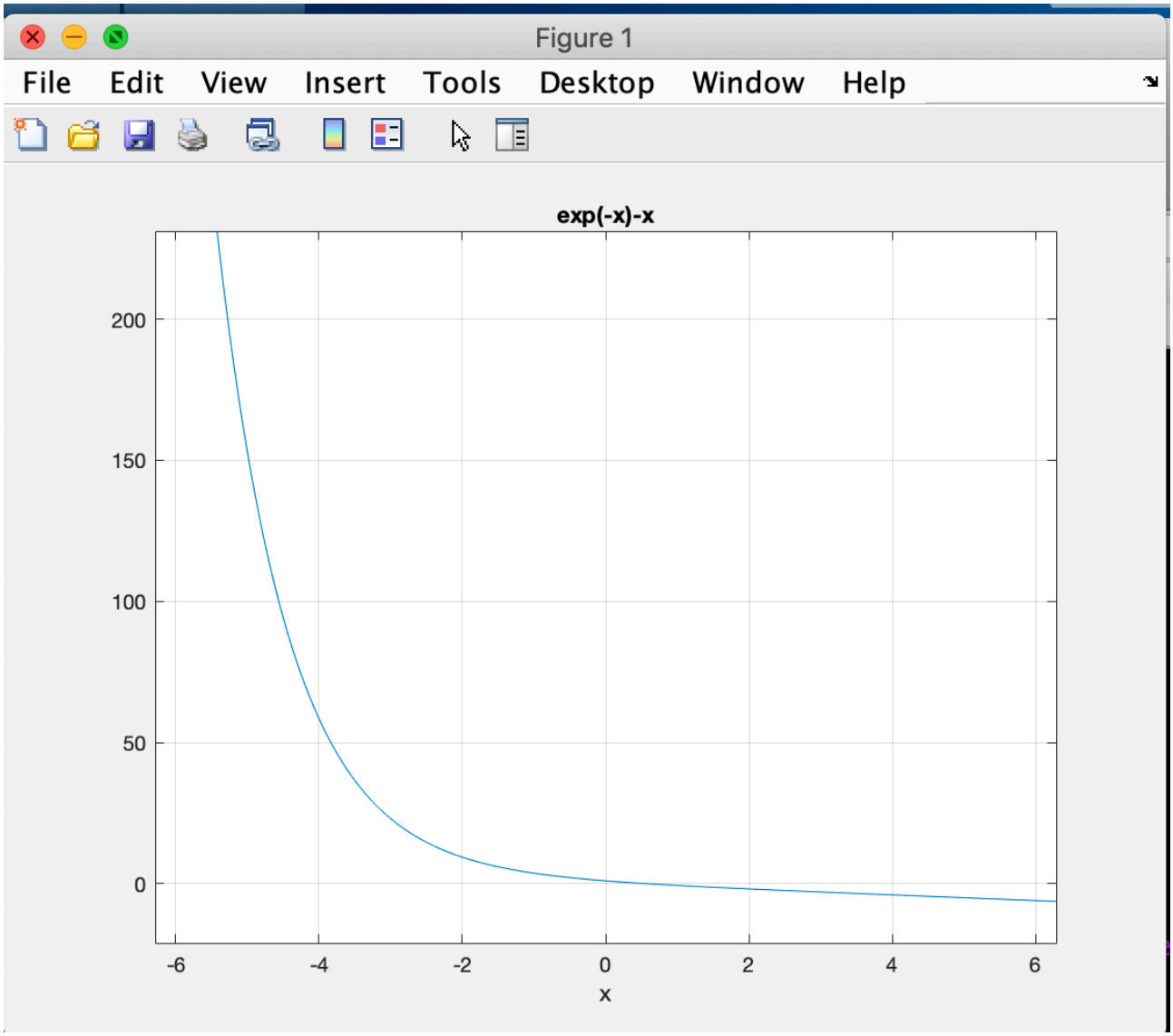
Graph of approximate relative error vs iteration number:



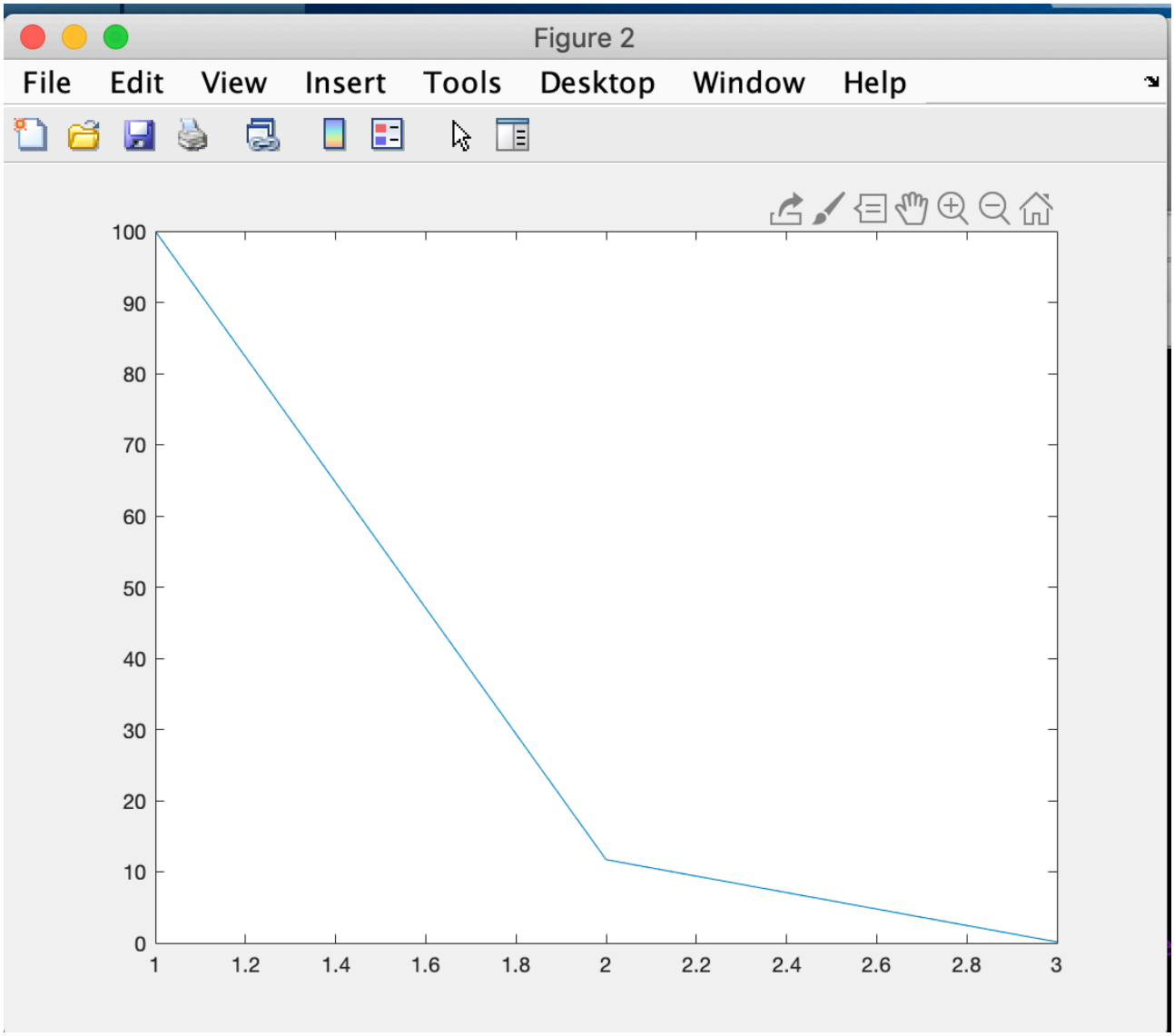
4.)NEWTON-RAPHSON:

```
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: Newton-Raphson
Enter a function: exp(-x)-x
Enter x1: 0
Enter relative error limit: 0.05
Enter function value limit: 0.0001
Enter iteration number limit: 50
Convergence criterion for function value is met
The root of the function: 0.567143
>>
```

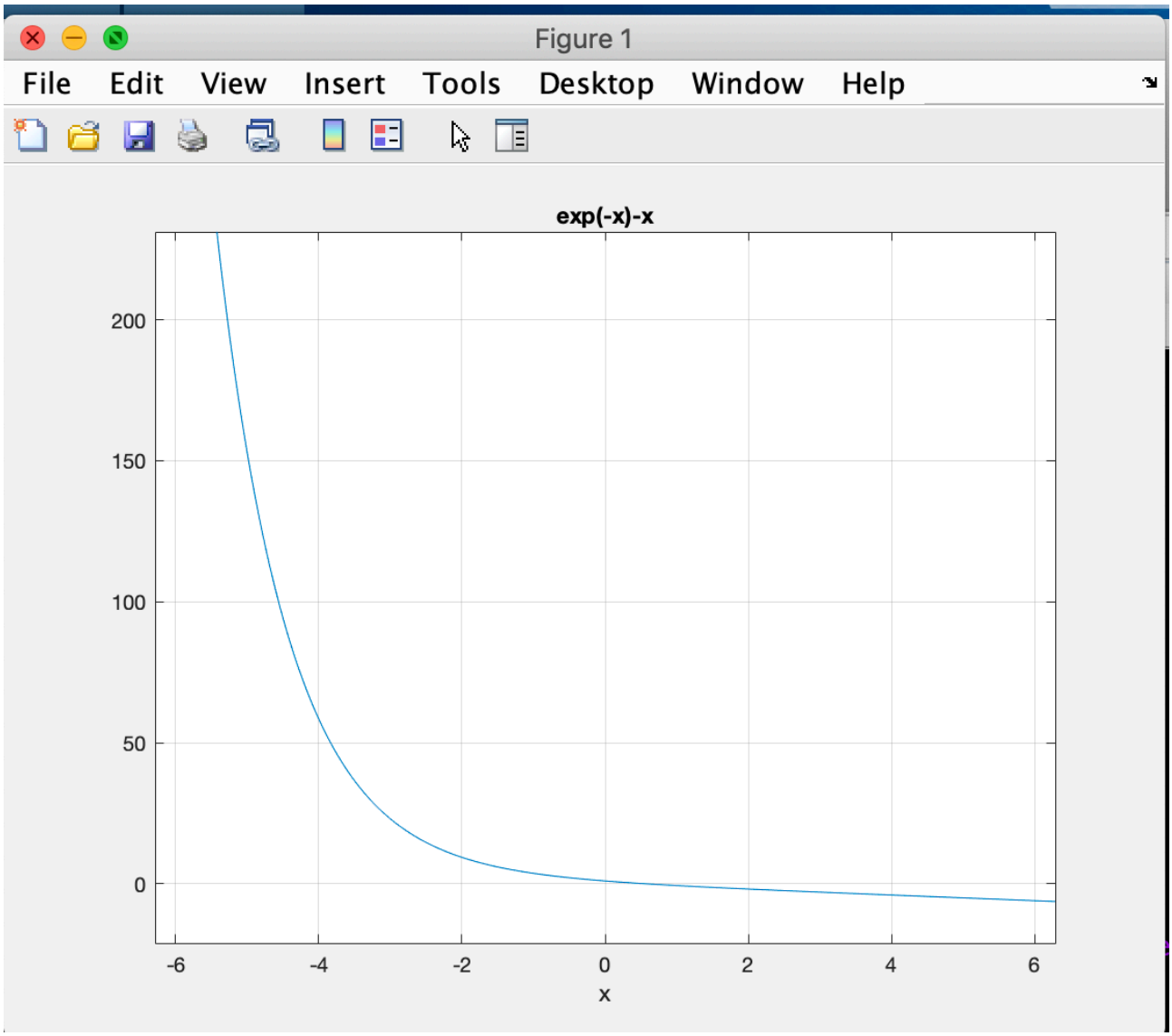
Graph of f(x) vs x:



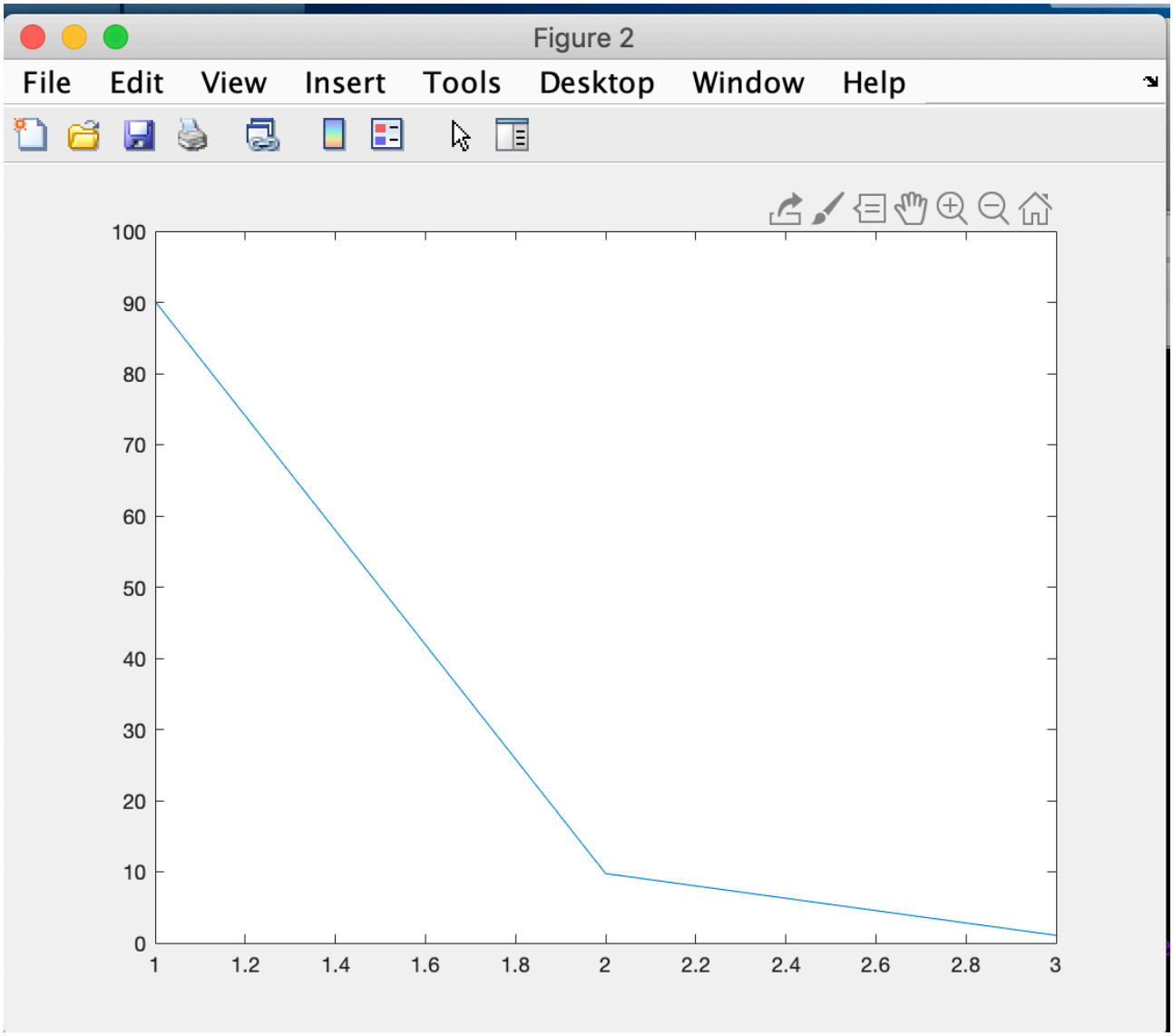
Graph of approximate relative error vs iteration number:



5.) SECANT :
>> programming_assignment_1
Is equation a polynomial?: N
What is your choice of method?: Secant
Enter a function: exp(-x)-x
Enter x1: 0
Enter x2: 0.05
Enter relative error limit: 0.05
Enter function value limit: 0.00001
Enter iteration number limit: 50
Convergence criterion for maximum relative error is met
The root of the function: 0.567143
>>
Graph of f(x) vs x:



Graph of approximate relative error vs iteration number:

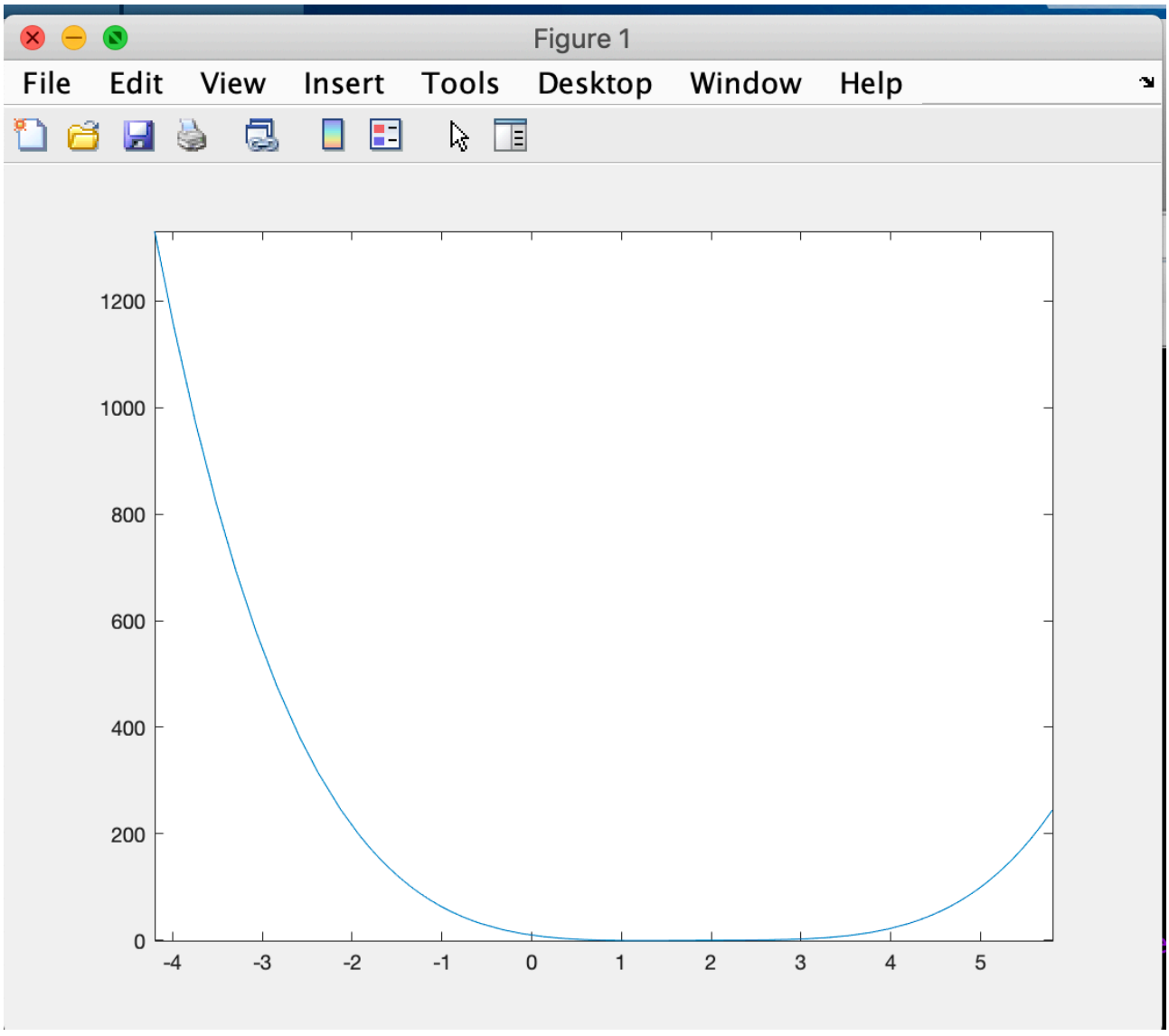


f(x) = x4 - 7.4x 3 + 20.44x 2 - 24.184x + 9.6448

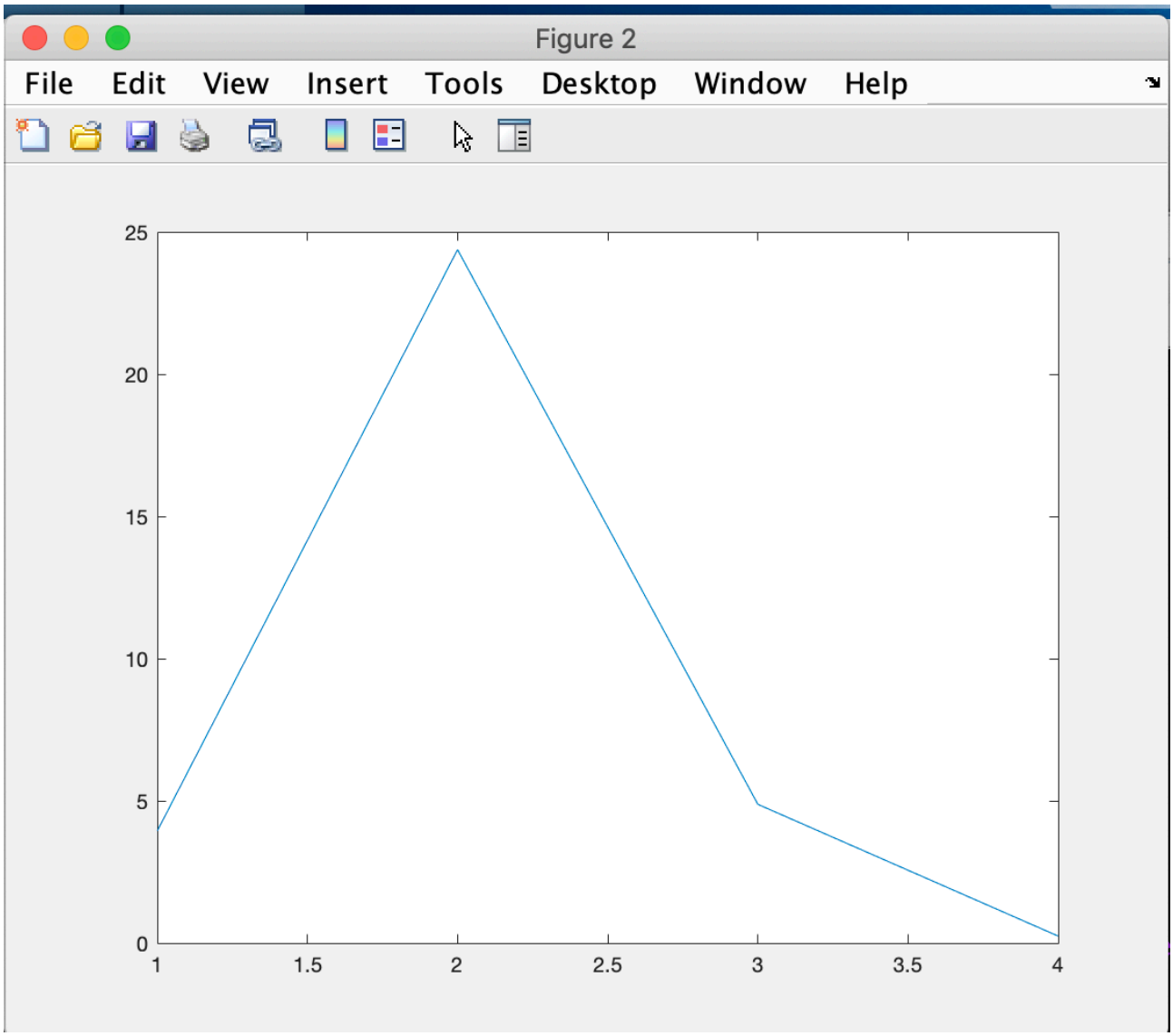
1.)MULLER

>> programming_assignment_1
Is equation a polynomial?: Y
Enter a polynomial: x^4 - 7.4*x^3 + 20.44*x^2 - 24.184*x + 9.6448
What is your choice of method?: Muller
Enter x0: -1
Enter x1: 0
Enter x2: 1
What would you like as the maximum relative approximate error(number you enter will be taken as percentage): 0.01
What should be the maximum iteration number the program should run: 50
Convergence criterion for maximum relative error is met
The root of the function: 0.800000
>>

Graph of f(x) vs x:



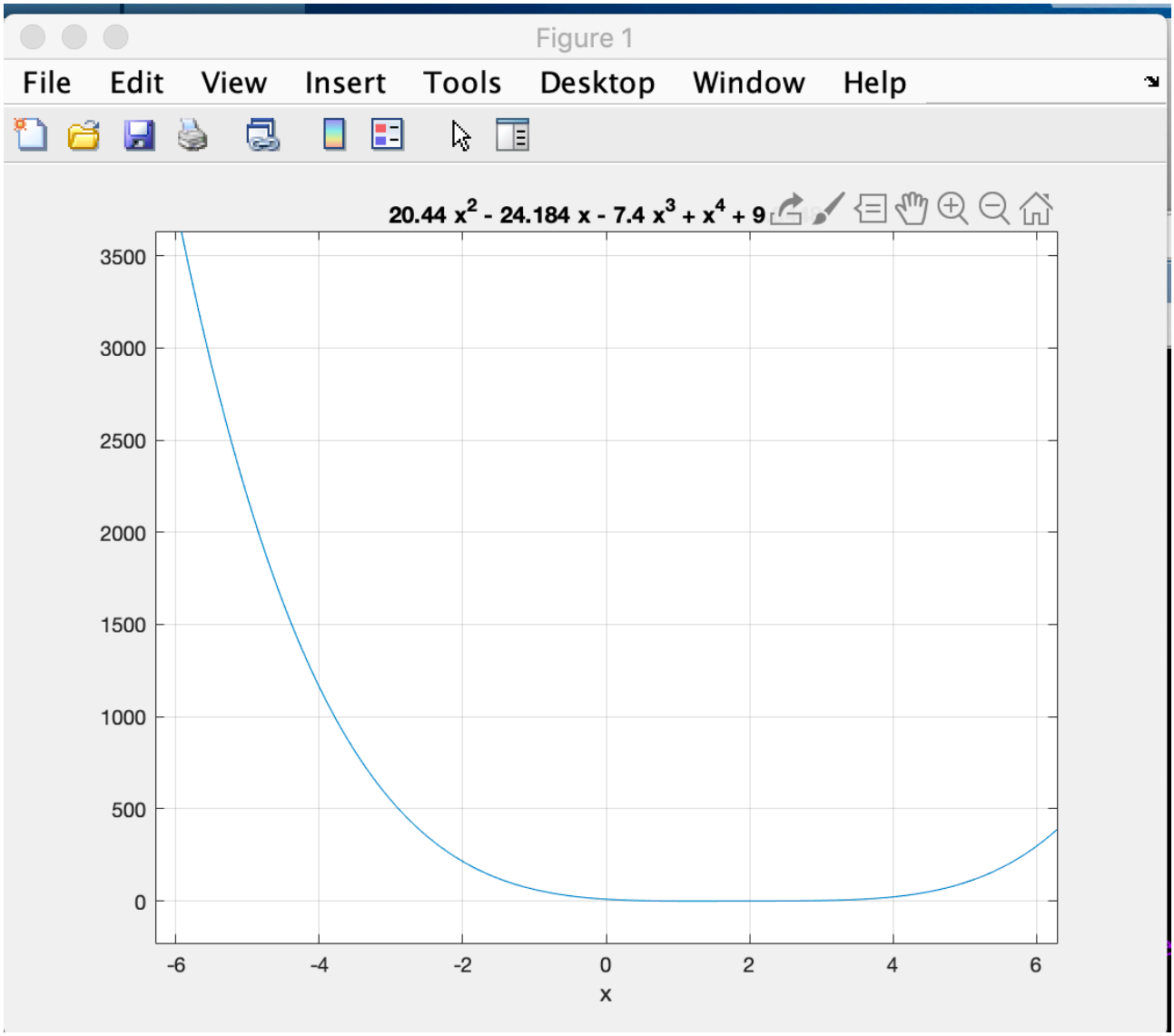
Graph of approximate relative error vs iteration number:



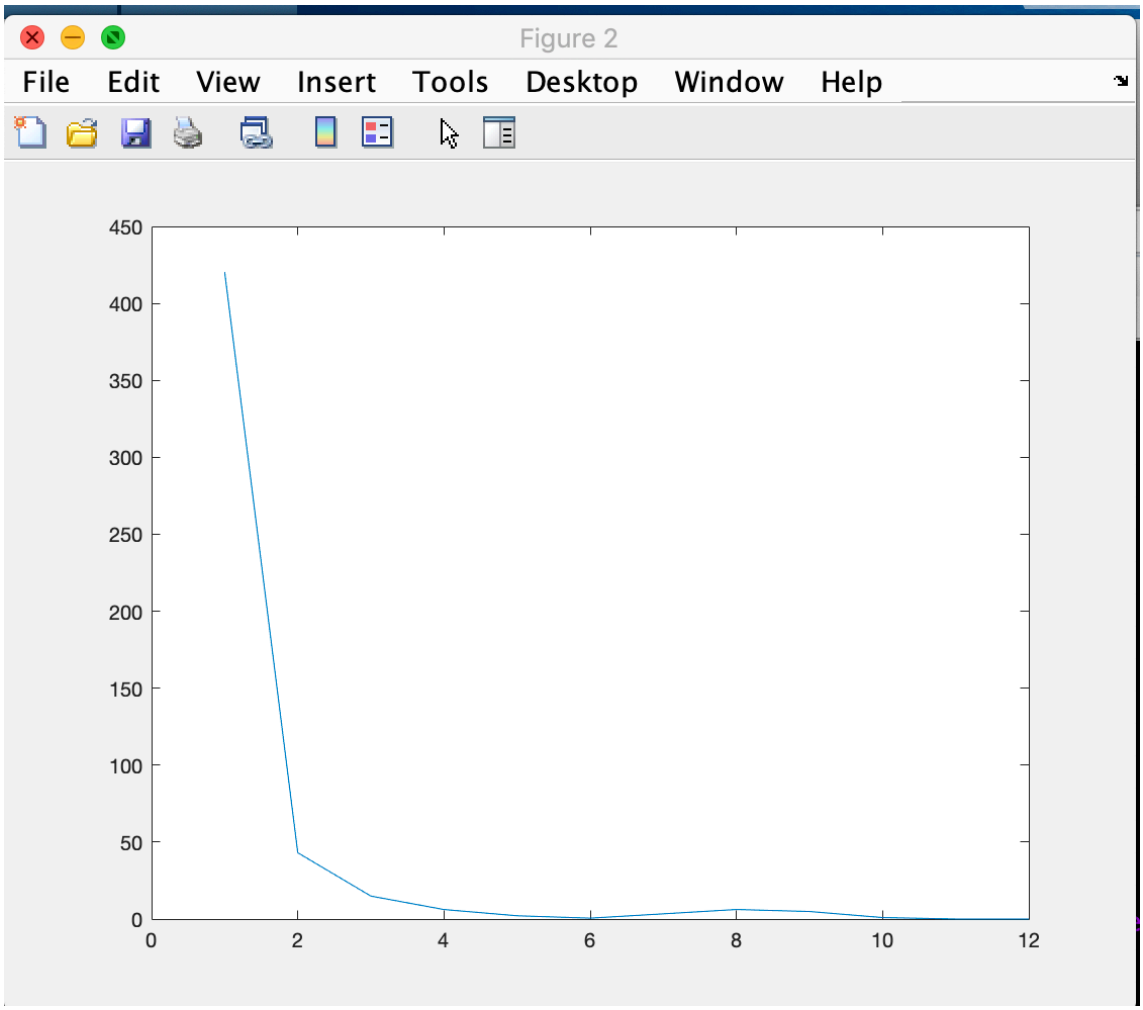
2.)BAIRSTOW: (-5,4)

```
>> programming_assignment_1
Is equation a polynomial?: Y
Enter a polynomial: x^4 - 7.4*x^3 + 20.44*x^2 - 24.184*x + 9.6448
What is your choice of method?: Bairstow
Enter starting point r: -5
Enter starting point s: 4
What would you like as the maximum relative approximate error(number you enter will be taken as
percentage): 0.01
What should be the maximum iteration number the program should run: 50
The two roots of the functions are: 2.200000, 0.800000
The other two roots of the functions are: 2.200000 + 0.800000i, 2.200000 - 0.800000i
>>
```

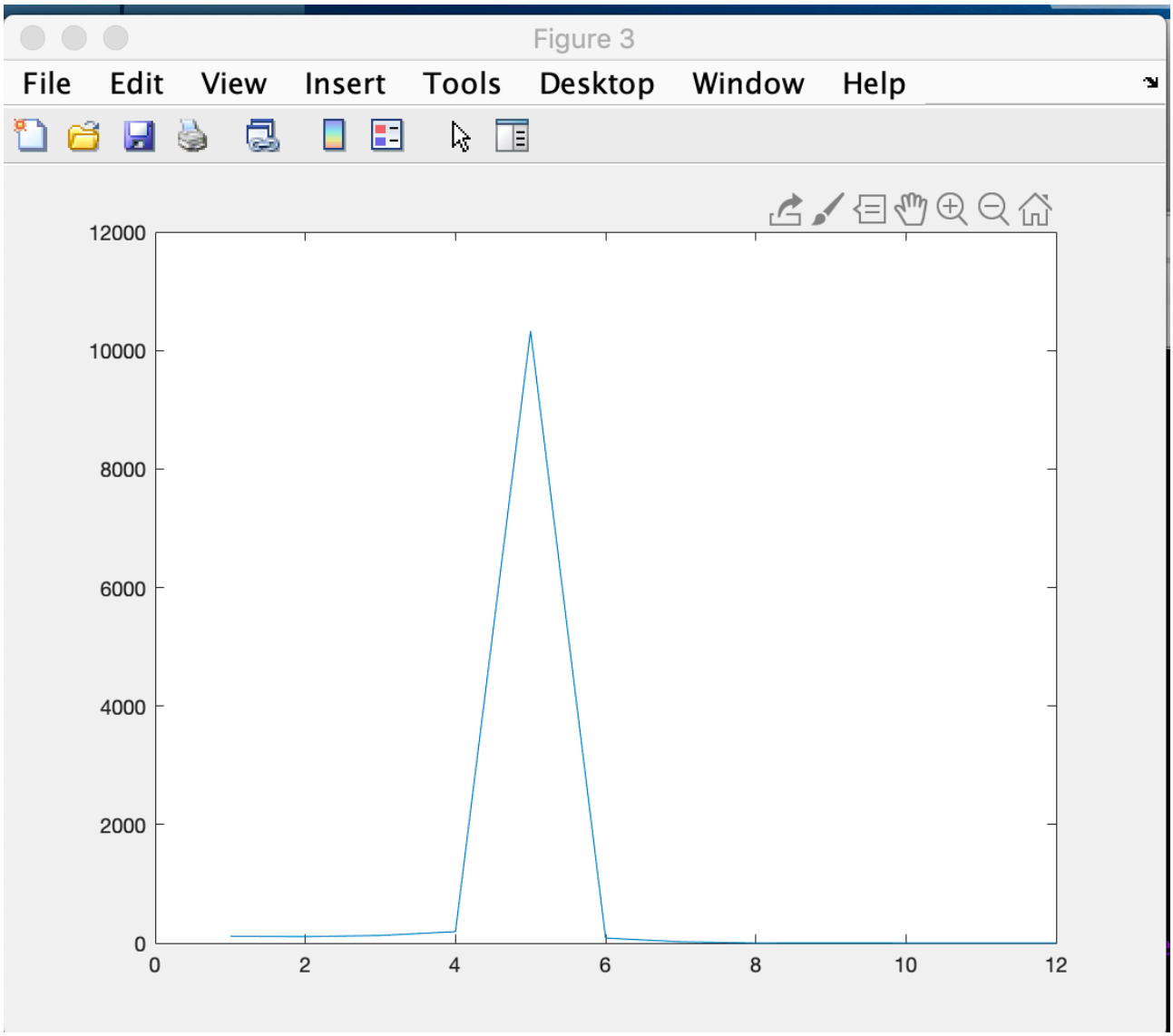
Graph of f(x) vs x:



Graph of approximate relative error of r vs iteration number:



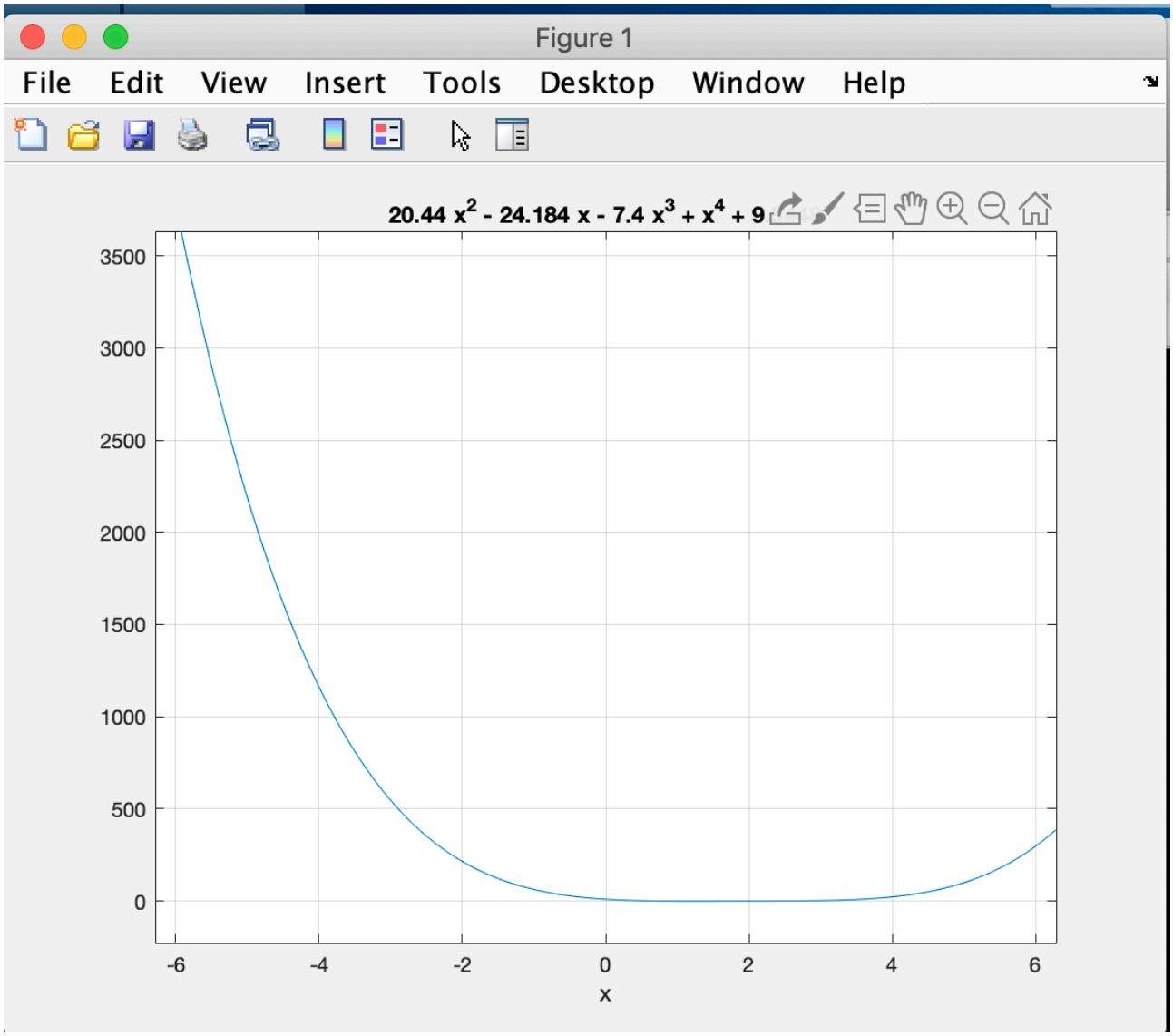
Graph of approximate relative error of s vs iteration number:



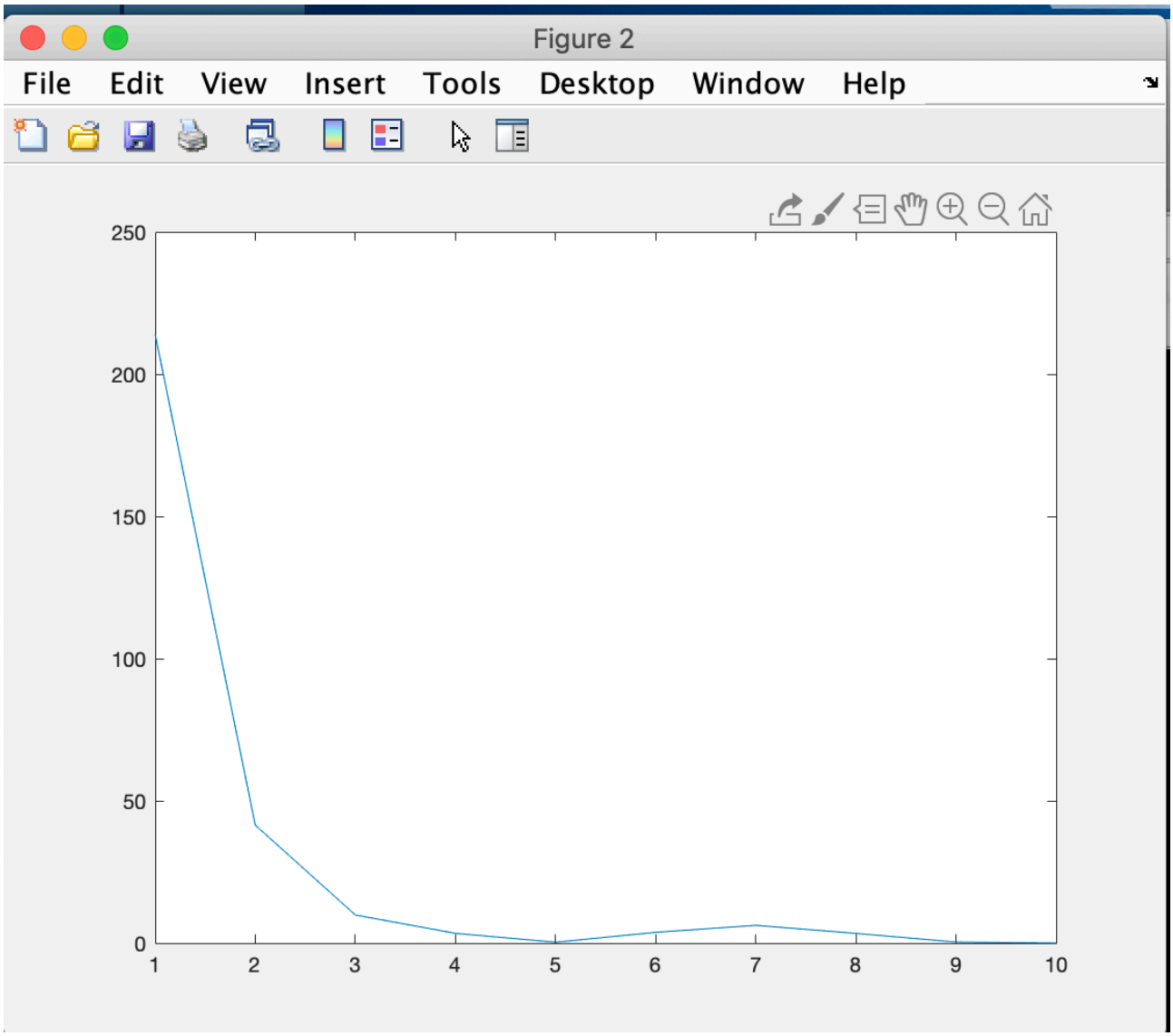
2.)BAIRSTOW: (-2,2)

```
>> programming_assignment_1
Is equation a polynomial?: Y
Enter a polynomial: x^4 - 7.4*x^3 + 20.44*x^2 - 24.184*x + 9.6448
What is your choice of method?: Bairstow
Enter starting point r: -2
Enter starting point s: 2
What would you like as the maximum relative approximate error(number you enter will be taken as
percentage): 0.01
What should be the maximum iteration number the program should run: 50
The two roots of the functions are: 2.200000, 0.800000
The other two roots of the functions are: 2.199954 + 0.800004i, 2.199954 - 0.800004i
>>
```

Graph of f(x) vs x:



Graph of approximate relative error of r vs iteration number:



Graph of approximate relative error of s vs iteration number: