

Here are some sample questions from old tests. Some topics that we covered are not represented by these questions, but are still fair game.

1. Write a MATLAB **script** program to plot the functions $f(x) = x + \sin(x)$ and $g(x) = x^2$ on the same graph, on the interval $[1, 7]$. Include comments.
2. The function $f(x) = 3x^2 - 5$ is continuous and $f(-1) < 0 < f(7)$, so it has a zero on the interval $[-1, 7]$. Perform 3 iterations of the bisection method to narrow down this interval.
3. For $f(x) = x^2 - 5$, do 2 iterations of the bisection method, starting with $[a, b] = [2, 3]$. What is the relative error? About how many more steps would be needed to make the error less than 10^{-6} ?
4. Write a MATLAB **function** program to do n steps of the bisection method for a function f with starting interval $[a, b]$. If $|f(x)| > tol$ after n iterations, print a warning. Let f , a , b , n , and tol be the inputs and the final x be the output. Include comments.
5. Write a MATLAB **function** program to do n steps of the bisection method for a function f with starting interval $[a, b]$. Let f , a , b and n be the inputs and the final x be the output. Include comments.
6. For $f(x) = 3x^2 - 4$, do 2 iterations of Newton's method, starting with $x_0 = 1$.
7. For $f(x) = x^2 - 5$, do 2 iterations of Newton's method, starting with $x_0 = 2.0$. What is the relative error of x_2 ? About how many more steps would be needed to make the error less than 10^{-16} ?
8. Write a MATLAB **function** program to do Newton's method for a function f until $|f(x)| < tol$. Let f , f' , x_0 and tol be the inputs and the final x be the output. Include comments.
9. List your 10 least favorite MATLAB commands.
10. Write a MATLAB **function** program that calculates the sum of the squares of the first n integers.
11. Write a MATLAB **function** program which will find the roots of a function f on an interval $[a, b]$.