

Here are some sample questions, mostly from old tests. Most of the test will be quite similar to these, but other topics that we covered are still fair game.

1. Write a well-commented 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. Write a well-commented MATLAB **function** program that calculates the sum of the squares of the first n integers.
3. The sequence of numbers

$$\cos(1), \cos(2), \dots, \cos(999), \cos(1000)$$

has some positive elements and some negative ones. Write a well-commented MATLAB **script** program that calculates the sum of the positive elements.

4.
 - For $f(x) = 4x^2 - 2$, do 2 iterations of Newton's method, starting with $x_0 = 1$.
 - Formulate the residual and the error of your final approximation.
5. Write a well-commented 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.
6. The function $f(x) = 3x^2 - 30$ is continuous and $f(-3) < 0 < f(5)$, so it has a zero on the interval $[-3, 5]$.
 - Perform 3 iterations of the bisection method to narrow down this interval.
 - How many iterations will it take before you know the zero within 10^{-7} ?
7. Write a well-commented 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.
8. Write a well-commented MATLAB **function** program that will find the roots of a function f on an interval $[a, b]$.
9. Write a well-commented MATLAB **function** program to do n steps of the Regula Falsi 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.