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 $10^{-10}$?

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 $[a, b]$. 