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. (a) We can approximate $\sqrt{2}$ by setting $f(x) = x^2 - 2$ and solving for $f(x^*) = 0$. A reasonable starting guess is $x_0 = 1$. Do two iterations of Newton's method to get a better approximation for $\sqrt{2}$.

   (b) Write a MATLAB function with inputs `z` and `tol` that computes $\sqrt{z}$ to tolerance `tol` using Newton's method, and returns the result. Include comments. (It is illegal to use `sqrt` in your program.)

2. List your 10 least favorite **Matlab** commands.

3. Suppose $f(x)$ has been defined as an inline function. Give MATLAB commands to plot it on the interval $[0, 10]$.

4. Write a MATLAB function program that calculates the sum of the squares of the first n integers.

5. For $f(x) = x^3 - 6$, do 2 iterations of Newton's method, starting with $x_0 = 2$.

6. 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}?

7. Write a **Matlab** 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 the output.

8. Write a MATLAB program to do n steps of Newton's method for a function f with starting interval $[a, b]$. Let f, f', x_0 and n be the inputs and the final x the output.

9. 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}?

10. Write a function program which will find the roots of a function f on an interval $[a, b]$.