MATH 310: Numerical Analysis
Details for Exam 1

The first exam in MATH 310 will be Thursday, October 15. You should bring a calculator to perform rudimentary computations, but you are not permitted to access symbolic computations or the internet on your calculator. Any student violating this rule will receive an 'F' on the exam.

The exam will cover up to Section 3.6 in your book, with emphasis on the things that were emphasized in class. You should expect to be asked to write a little bit of code and to perform a few iterations of the algorithms we covered. In particular, you should

1. Know by heart the following theorems: Taylor's Theorem with remainder, version (1.3) in text, Theorem 2.3 on Trapezoid Rule Error Estimate with a uniform grid, Theorem 3.1 on Bisection Convergence and Error, Theorem 3.2 on the Newton Error Formula.

2. Know and be able to use the following definitions: $\mathcal{O}$ notation, absolute error, relative error, machine epsilon, order of convergence of $x_n \to \alpha$.

3. Understand floating point arithmetic, including its pitfalls, the concept of machine epsilon, and overflow and underflow errors.

4. Know and be able to use the following algorithms: Horner's method, difference approximations to the derivative $f'(x)$, linear interpolation using two nodes, trapezoid rule, root finding algorithms including bisection and Newton's method. "Knowing" includes understanding the algorithms' strengths and weaknesses, and their errors, and rates of convergence.

5. Be able to use Gaussian elimination to solve a linear system of three equations in three unknowns.

There is no guarantee that the list above is complete, but it gives you the idea of what you should focus your studying on.