Math 444/544 **Guide for Test 2**

Test 2 is on Thursday 16 October, and covers Chapter 2. Here are some sample questions from Chapter 2.

1. Consider the function $f(x) = **$. It has a root somewhere on the interval $[*, *]$. Our initial guess for the root is $x_0 = **$.

   (a) Perform 2 iterations of the bisection method to get a better approximation for the root. What bound do we have on the error of this approximation?

   (b) Perform 2 iterations of Newton's method to get a better approximation for the root. What bound do we have on the error of this approximation?

   (c) Perform 2 iterations of the secant method to get a better approximation for the root. Use $x_{-1} = *$ as the second point you need to get started. What bound do we have on the error of this approximation?

   (d) Discuss the advantages and disadvantages of these three methods.

2. Consider the function $g(x) = **$.

   (a) Show that g has a fixed point on the interval $[*, **]$

   (b) Determine the order of convergence of the iteration $x_{n+1} = g(x_n)$.

3. **Math 444 students:** Make sure you wrote your name on the test.

   Math 544 students: The book has the following theorem:
   Something like theorem 2.8
   Prove this theorem.