Math 444/544 **Fall 2010**
Homework 3, due Friday 24 September.

1. (20 points) Adjust your proposed changes to a Wikipedia page, based on my comments on your homework 2. Edit the **discussion** page associated to the Wikipedia page with a description of your proposed changes and your rational. Print the portion of the discussion page with your proposal.

2. (25 points)

   (a) Write a MATLAB function to do the secant method. Start from

   ```
   function x = secant(f,x0,x1,epsilon)
   % Performs the secant method to find a root of f.
   % Inputs: f -- the function, as an inline
   %         x0 -- an initial guess
   %         x1 -- a newer initial guess
   %         epsilon -- the allowed error. The function terminates when
   ```

   (b) Apply it to the function $f(x) = x^2 - 3$ starting with $x_0 = 1$ and $x_1 = 2$ to find an approximation to $\sqrt{3}$ correct within 10^{-4}.

3. (30 points) Do this problem as a Good Problem, paying attention to the *Flow* handout.

   For $A > 0$ and $n \geq 1$, consider the fixed point iteration

   $$x_n = \frac{1}{2}x_{n-1} + \frac{A}{2x_{n-1}},$$

   which you used in Homework 2. Determine (and prove) the rate (order) of convergence of this iteration.

4. (25 points)

   (a) Approximate the function $f(x) = e^{2x}$ using a Lagrange interpolating polynomial of degree 3 based on the points $x = 8.1$, 8.3, 8.6, and 8.7.

   (b) Use the error bound for polynomial interpolation to bound the error at $x = 8.4$.

   (c) Evaluate f and your approximation at $x = 8.4$ and compute the actual error.