Math 4600/5600 **Fall 2012**
Homework 3, due Friday 14 September.

1. (20 points) (4600 students do individually) Explore the Wikipedia pages on the topics that we have covered so far. Find something that is incorrect, incomplete, or poorly explained. It should be more than just a typo, but does not need to be very big. Something that requires one paragraph addition or modification is about right.

   - Edit the **Talk** page associated to the Wikipedia page with
     (a) A description of what you think is wrong with what is there.
     (b) Your corrected/ improved version. This should be ready to be pasted into the real Wikipedia page.

     Be sure to login before editing and to sign your edit with `~~~~` so it associates to you as a user.
   - Edit your user page so it has a link to your edit on the Talk page.

   I will look at your user page to find out what you did.

2. (25 points) Do this problem as a Good Problem, paying attention to the *Flow* handout.

   Find an approximation to $\sqrt{3}$ correct within 10^{-4} by using the bisection method on $f(x) = x^2 - 3$ starting on $[1, 2]$.

3. (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}.

4. (30 points)

   (a) Show that Newton's method applied to $f(x) = x^2 - 3$ leads to the iteration

$$x_n = \frac{1}{2}x_{n-1} + \frac{3}{2x_{n-1}}\,.$$

   (b) Show that $\sqrt{3}$ is a fixed point of this iteration.
   (c) Draw a cobweb plot to show where the starting points $x_0 = 1$ and $x_0 = 2$ lead to under the iteration.
   (d) Prove that if $x_0 > 0$ then this converges to $\sqrt{3}$ and determine (and prove) the rate (order) of convergence of this iteration.
   (e) Use this iteration to approximate $\sqrt{3}$ correct within 10^{-4} starting at $x_0 = 2$.