Homework: Assigned Monday, Sep 11
Due Friday, September 15

NOTE: Those dates were wrong- They were for a week earlier

1. In Matlab, find the smallest value of p for which the expression:

$$\frac{\tan(x) - x}{x^3}$$

when evaluated in double precision at $x = 10^{-p}$ has no correct significant digits. (Hint: First we need the exact value- Take the limit (by hand) as $x \to 0$. Then let $p = -1, -2$, etc. until you find the right p value).

2. Use the Bisection Method (in Matlab) to find the root to six correct decimal places: $3x^3 + x^2 = x + 5$.

3. Use Bisection to find two real numbers x, correct to within 6 decimal places, that make the determinant of the matrix:

$$A = \begin{bmatrix} 1 & 2 & 3 & x \\ 4 & 5 & x & 6 \\ 7 & x & 8 & 9 \\ x & 10 & 11 & 12 \end{bmatrix}$$

equal to 1000. Hint: A little preprocessing in Maple might make this an easier problem.

4. You have a spherical tank with radius 1 meter. You pour 1 cubic meter of water into the tank. Find the height of the water to within 1 millimeter.

Hint: The volume of the bottom H meters of a hemisphere of radius R is $\pi H^2(R - \frac{1}{3}H)$.

5. Use fixed point iteration to find a root of $\cos(x) = \sin(x)$. In order to compare your results with other people, let us get our iteration method by adding x to both sides, and start with $x_0 = 0$, with 19 iterations (before using Matlab, what is the solution?).

Have Matlab compute e_{i+1}/e_i. Does this number look right? (Hint: Recall our proof of convergence).