Homework 6

1. a) Show that the function $f(x) = tan(x) - 2x$ has a root r with $0 < r < \pi/2$. (Hint: sketch a graph.)

b) Use a calculator or computer and the bisection method to find the root to some reasonable accuracy.

c) Use a calculator or computer and Newton's method to find the root to some reasonable accuracy.

2. Let

$$A = \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix}, \quad Z = \begin{pmatrix} 1 \\ 2 \end{pmatrix}.$$

Define

$$f(X) = (X - Z) \bullet A(X - Z).$$

Starting with $X_0 = [0, 0]$, show that Newton's method finds the minimizer of f in one step.

3. Attack problem two with the steepest descent method. Starting at X_0, use two iterations.

4. Attack problem two with the Gauss-Seidel method. Starting at X_0, go through 4 steps, two for each of the two coordinate directions.