Homework 2, due Thursday Oct 8th.

Chapter 6:
    6.3, 6.4, 6.14

Chapter 7:
    7.4

Additional Problems

1. Apply a simple Newton's method code to find a root of the one dimensional function $f(x) = \cos(x) - x$. (i) Starting from the point $x = -1$, what happens? (ii) Based on the plot of the function x and $\cos(x)$, the root should be near using the starting point $\frac{\pi}{4}$. How many digits of accuracy do you obtain after 3 iterations?

2. Use Newton's method to find a solution to the following problem. Iterate until you have six decimal places of accuracy. Start from (1,1).

$$3x^2 - y^2 = 0,$$

$$3xy^2 - x^3 - 1 = 0$$

3. Find the spectral radius and operator norm (using the standard Euclidean norm for vectors) of

(a) $M = \begin{bmatrix} 4 & 1 \\ 1 & 4 \end{bmatrix}$

(b) $M = U\,D\,V$, where

$$U = \frac{1}{sqrt(5)}\begin{bmatrix} 2 & 1 \\ 1 & -2 \end{bmatrix}, \qquad D = diag(7,3), \quad V = \frac{1}{sqrt(2)}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

(the matrices are square with semicolon indicating new line).