Homework 4: Due February 7th, 2017

First, do these problems. These will be graded for completion.

- 2.1: 4, 10, 17, 23, 27, 28b, 32, 33 (The point of 32 and 33 is that this means that any of the standard induced matrix norms are all roughly the same size. The technical term is that they are “equivalent” norms.)

Then do these problems. These will be graded for correctness.

1. Watkins 2.1.14

2. Write a function in MATLAB that takes as input a $2 \times 2$ matrix $A$ and return as output the approximate matrix 2-norm. Compute the approximate matrix 2-norm, by multiplying $A$ by 100 unit vectors, $x_k$ for $k = 1, 2, ..., 100$, pointed in directions $\left(2\pi/100\right)k$ radians. The approximate matrix 2-norm is the maximum of the 100 resultant vector norms, $\|Ax_k\|_2$. (Note: this is a conceptual assignment and isn’t how mathematicians usually calculate the matrix 2-norm. We’ll learn a better way later.) To test your code, if you enter the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, you should get an output of 5.4644, which is close to the “true” value 5.4650.

For additional practice, here are some optional problems. These should not be turned in.

- 2.1: 11, 13, 30