Homework Assignment 7

Due by Friday 11/21/2014 at start of class.

Collected:

(1) (3 points) For each of the following matrices A, find S and Λ so that $S^{-1}AS = \Lambda$.

(a) $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$

(b) $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$

(2) (3 points)

(a) Find an orthonormal basis for the subspace of $\mathbb{R}^5$ spanned by the vectors:

$$\begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \quad \begin{bmatrix} 1 \\ 1 \\ 1 \\ 0 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 0 \\ 0 \\ 1 \\ 1 \\ 1 \end{bmatrix}.$$

(b) What 5×5 matrix projects onto this subspace?

(3) (4 points) Compute the eigenvalues of $A = \begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$.

BONUS! (5 points). How does the matrix in problem 3 relate to the Fibonacci numbers? Imitate the example in the book and use this matrix to describe a formula for Fibonacci numbers.