Homework #4
ME EN 5210/6210 & CH EN 5203/6203 & ECE 5652/6652
Linear Systems & State-Space Control

Use this page as the cover page on your assignment, submitted as a single pdf.

Problem 1

For each of the following matrices: (1) find the eigenvectors and their associated eigenvalues, and normalize the eigenvectors to be unit length; (2) form a matrix Q whose columns are the eigenvectors of A; and (3) find the diagonal matrix that is similar to A. In each step, you must show all of your work. Consider using MATLAB to check your answers.

$$A = \begin{bmatrix} 2 & 0 \\ 0 & 8 \end{bmatrix}$$

$$A = \begin{bmatrix} 2 & 3 \\ 0 & 8 \end{bmatrix}$$

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

Problem 2

Find the Jordan-form representations of the following matrices:

$$A_1 = \begin{bmatrix} 1 & 4 & 10 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix} \quad A_2 = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -4 & -3 \end{bmatrix} \quad A_3 = \begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{bmatrix} \quad A_4 = \begin{bmatrix} 0 & 4 & 3 \\ 0 & 20 & 16 \\ 0 & -25 & -20 \end{bmatrix}$$

Note that all be A_4 can be diagonalized.