CS 357 / MATH 357
Fall 2013

Numerical Methods – Homework 8
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Due: 11/19/2013

Note: Homework is due **5pm** on the due date. Please submit your homework through the dropbox in the Siebel Center basement. Make sure to include your name and **netid** in your homework.

Problem 1 [10pt] Compute the eigenvalues and the eigenvectors associated with the following matrix. Please show all the steps in your calculation:

$$\mathrm{A}= \begin{bmatrix} 1 & 2 & 1 \\ 6 & -1 & 0 \\ -1 & -2 & -1 \end{bmatrix}$$

Problem 2 [10pt] Find the singular value decomposition of the following matrix. Please show all the steps in your calculation:

$$\mathrm{A}= \begin{bmatrix} 2 & 2 \\ -1 & 1 \end{bmatrix}$$

Problem 3 [5pt] A computer system can operate in two different modes. Every hour it remains in the same mode or switches to a different mode according to the transition probability matrix

$$\mathrm{P}= \begin{bmatrix} 0.4 & 0.6 \\ 0.6 & 0.4 \end{bmatrix}$$

If the system is in Mode 1 at 5:30 p.m., what is the probability that it will be in Mode 1 at 8:30 p.m. on the same day?

Problem 4 [2pt] True/False questions

(a) **(Truel/False)** Every square real and symmetric matrix has real eigenvalues

(b) **(Truel/False)** The eigenvalues may be negative when A is symmetric