Maths 3194: Matlab Project
Spring 2011

Due Date: No later than 2:10 on Thursday, April 28.

Points: This project is out of 10 points.

Instructions: You are to work alone on this project, although you may ask for minor assistance from any of the departmental faculty. You should rely heavily on the help files within Matlab and the Internet to aid you finishing this project.

You have two options for how to turn in your project. First, you can directly print out any work from Matlab, so that the instructor can see what you entered as well as what the corresponding output was. If there is any unnecessary output, you can feel free to delete it before submitting it for a grade, although you may find this difficult to do in Matlab. The second option is to turn your work into a pdf document that shows all pertinent output, which you can send to the instructor via email. Only pdf attachments will be accepted, and the student is responsible for making sure that everything exports properly.

Project Problems:

Problem 1: Solve the following system of linear equations:

$$\begin{array}{rcrcrcr} 2x_1 & + & 3x_2 & - & 4x_3 & = & 11 \\ x_1 & - & 2x_2 & + & x_3 & = & -2 \\ -x_1 & + & 2x_2 & + & 2x_3 & = & 5. \end{array}$$

Problem 2: Consider the following system of linear equations:

$$\begin{array}{rcrcrcr} 2x_1 & + & x_2 & - & 5x_3 & = & -1 \\ x_1 & - & & + & 6x_3 & = & 2 \\ -6x_1 & + & 2x_2 & + & 4x_3 & = & 3. \end{array}$$

Find a solution for this system, say **x**, and then compute the value of **Ax** - **b**, where **A** is the coefficient matrix and **b** is the column vector which represents the righthand side of our system. Do you get the zero vector? What is happening here?

Problem 3: Let $X = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$ and $Y = \begin{pmatrix} -1 & 0 & 4 \\ 10 & 2 & 5 \\ -3 & 7 & 12 \end{pmatrix}$.

Compute $X + Y$, $X - Y$, XY, YX, X^T, and $X^2Y - Y^TX$. Without typing them in separately, multiply the second row of X by the third column of Y.

Problem 4: Consider the matrix $G = \begin{pmatrix} 1 & 3 \\ 3 & 9 \end{pmatrix}$. Compute G^{-1}.

Problem 5: Consider the matrix $M = \begin{pmatrix} .05 & .002 & 0 \\ 1 & .02 & 0 \\ 0 & 0 & .004 \end{pmatrix}$.

Find the determinant and the inverse of M. Find the determinant of M^{50}. Does this mean that M^{50} is singular (noninvertible)? What is happening here?

Problem 6: Let $Z = \begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & -2 & 0 & 0 \\ 0 & 0 & 2 & 1 \\ 0 & 0 & 3 & 0 \end{pmatrix}$.

Find the eigenvalues and corresponding eigenvectors of Z.