HOMEWORK SET 2

MAT 217 · FALL 2008

You must show all work to get full credit. You can use a calculator to check your work.

Problem 1. Find the solution to the system of equations below using the Gauss-Jordan Method

$$\begin{cases} 2x_1 + x_2 &= 8 \\ x_1 + 3x_2 &= 9 \end{cases}$$

Problem 2. Use Gauss-Jordan Method to solve the linear system

$$\begin{cases} 2x_1 + 4x_2 - 2x_3 &= 2 \\ 4x_1 + 9x_2 - 3x_3 &= 8 \\ -2x_1 - 3x_2 + 7x_3 &= 10 \end{cases}$$

Problem 3. Find the solution to the system of equations below using the Gauss-Jordan Method

$$\begin{cases} 3x_1 + 7x_2 + 4x_3 + 4x_4 &= -7 \\ 7x_1 + 7x_2 + 4x_3 + 7x_4 &= 3 \\ 4x_1 + 3x_2 + 2x_3 + 3x_4 &= 2 \\ 3x_1 + 2x_2 + x_3 + 3x_4 &= 4 \end{cases}$$

Problem 4. In mathematics, an elementary matrix is a simple matrix, which differs from the identity matrix in that one of elementary row operations is performed on the identity matrix. The following matrices are all elementary matrices.

$$\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix} \quad 2R1 \text{ on } I_2,$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix} \quad R2 \longleftrightarrow R3 \text{ on } I_3,$$

and

$$\begin{pmatrix} 1 & -3 \\ 0 & 1 \end{pmatrix} \quad R1 - 3R2 \text{ on } I_2.$$

Let

$$A = \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix}$$

and let

$$E_1 = \begin{pmatrix} \frac{1}{2} & 0 \\ 0 & 1 \end{pmatrix}, E_2 = \begin{pmatrix} 1 & 0 \\ -1 & 1 \end{pmatrix}, E_3 = \begin{pmatrix} 1 & 0 \\ 0 & \frac{2}{5} \end{pmatrix}, \text{and } E_4 = \begin{pmatrix} 1 & -\frac{1}{2} \\ 0 & 1 \end{pmatrix}$$

Date: September 7, 2008 *Due Date*: Monday, September 15, 2008.

M. Carty, Department of Mathematics, Scottsdale Community College.

be elementary matrices. Show that $E_4 \cdot E_3 \cdot E_2 \cdot E_1 \cdot A = I_2$. If $Au = b$ represents the linear systems of equations in problem 1, then find u in terms of the elementary matrices $E_1, E_2, ..., E_4$.