MATH 1010 Assignment 3 Summer 2014

1. State whether each of the following matrices is in row echelon form. If a matrix is not in row echelon form, use elementary row operations to change it to row echelon form. Use the notation of the notes to indicate the elementary row operations used.

(a) $\left(\begin{array}{cc|c} 1 & 3 & -2 \\ 0 & 1 & 4 \end{array}\right)$ (b) $\left(\begin{array}{ccc|c} 2 & 1 & 3 & 4 \\ 0 & 1 & 4 & 3 \\ 0 & 2 & 1 & 4 \end{array}\right)$ (c) $\left(\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 4 & 3 \\ 0 & 0 & 0 \\ 0 & 8 & 6 \end{array}\right)$

2. State whether each of the following matrices is in reduced row echelon form. If a matrix is not in reduced row echelon form, use elementary row operations to change it to reduced row echelon form. Use the notation of the notes to indicate the elementary row operations used.

(a) $\left(\begin{array}{ccc|c} 1 & 2 & -3 & 4 \\ 0 & 0 & 5 & 1 \\ 0 & 1 & 2 & 2 \end{array}\right)$ (b) $\left(\begin{array}{ccc|c} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -10 \end{array}\right)$ (c) $\left(\begin{array}{ccc|c} 3 & 0 & 1 & -6 \\ 0 & 1 & 2 & 5 \\ 0 & 0 & 4 & 4 \end{array}\right)$

3. Use augmented matrices and Gaussian elimination to find all solutions of the following systems of equations. Use the notation of the notes to indicate the elementary row operations used.

(a) $$\begin{aligned} 2x + y - z &= 6 \\ 3x - 2y + 4z &= 7 \\ 7x + 2z &= 1 \end{aligned}$$

(b) $$\begin{aligned} 3x + 2y + 2z &= 4 \\ 2x - y + 4z &= 8 \\ 4x + 2y - z &= 6 \end{aligned}$$

4. Use augmented matrices and Gauss-Jordan elimination to find all solutions of the following systems of equations. Use the notation of the notes to indicate the elementary row operations used.

(a) $$\begin{aligned} x + 2y - z &= 4 \\ 3x - 2y + 2z &= -1 \\ 10x - 4y + 2z &= 5 \end{aligned}$$

(b) $$\begin{aligned} x + y - 2z + 2w &= 1 \\ 3x - z + 5w &= 2 \\ 4x + y - 2z + 2w &= 2 \\ -2x - 2y + 3z + w &= -1 \end{aligned}$$

5. Find, if possible, inverses for the following matrices.

(a)$A = \begin{pmatrix} 2 & 1 & 3 \\ 1 & -1 & 2 \\ -1 & 5 & 0 \end{pmatrix}$ (b) $A = \begin{pmatrix} 3 & 2 & -1 \\ 4 & 5 & 2 \\ -2 & 1 & 4 \end{pmatrix}$