Math 1210 Tutorial #7 (Oct. 27 – Nov. 2)

1. Let $A = \begin{pmatrix} 3 & -2 & -1 \\ 2 & -1 & 0 \end{pmatrix}$, $B = \begin{pmatrix} 0 & -2 \\ 1 & 2 \\ -1 & 3 \end{pmatrix}$, $C = \begin{pmatrix} 2 & -1 \\ 1 & 3 \end{pmatrix}$, $D = \begin{pmatrix} 1 & 2 & -1 \\ 0 & 1 & -1 \\ -2 & -1 & 1 \end{pmatrix}$, $E = \begin{pmatrix} 3 & 2 & 1 \end{pmatrix}$ and $F = \begin{pmatrix} 4 \\ 1 \\ -3 \end{pmatrix}$. Indicate if each of the following expressions is defined or not. If the expression is defined, evaluate the resulting matrix.

(a) AC (b) $(A - B^T)F$ (c) ED (d) FE (e) $F^T E^T$ (f) C^2

2. Consider the matrix $\begin{pmatrix} 1 & 1 & 0 & 2 & 3 & 4 \\ 0 & 1 & 3 & 2 & 1 & -1 \\ 0 & 0 & 0 & 2 & -2 & 8 \end{pmatrix}$.

(a) Is this matrix in row-echelon form (R.E.F.)? If not, list the elementary row operations which must be performed in order to reduce it to row-echelon form.

(b) Reduce the above matrix to reduced row-echelon form (R.R.E.F.), indicating clearly the elementary row operations used to do so.

3. Solve the following system of equations using Gaussian elimination:

$$x + y - 2z = -2, \quad y + 2z = 3, \quad x + 2y = 1.$$

4. Solve the following system of equations using Gauss-Jordan elimination:

$$x + 3y + 3z = 0, \quad 2x + 7y + 2z = 6, \quad -x + y - 4z = 9.$$

5. Write the augmented matrix for the following system of equations:

$$2x - 2 = 3z, \quad 2y + 4t = x + 1, \quad x + 2y + 4z = 3z.$$

Solve the system.