# Math 1410–Assignment 3

**Due Friday (October 7, 2005) before the lecture in the class**

1. Find $2A - A^2$, where

$$A = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 0 & 0 & 0 \end{pmatrix}.$$

2. Find the values of $x, y$ that make $AB + A = 0$, where

$$A = \begin{pmatrix} x & 1 \\ 1 & -1 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 2 \\ y & 1 \end{pmatrix}.$$

3. Find $A^3 - 4A^2 + 4A$, where $A = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 2 \end{pmatrix}$.

4. write the following system of equations in matrix form $AX = B$ and identify the matrices $A, X$ and $B$:

$$\begin{array}{rcrcrcrcr} 3x^2 & - & 2y & + & 3z^3 & + & w & = & 7 \\ 2x^2 & - & 3y & - & 4z^3 & - & w & = & 3 \\ 11x^2 & + & y & + & 4z^3 & - & w & = & 31 \\ x^2 & + & y & - & 2z^3 & + & w & = & 11 \end{array}$$

5. If $A$, $B$, and $C$ are any $2 \times 2$ matrices, prove or disprove the following:
(a) $AB - BA = 0$ for all $A$ and $B$.
(b) $A^3 = 0$ implies $A = 0$.
(c) $BC = 2AC$ implies $B = 2A$ for all $A$, $B$ and $C$.
(d) If $AB = BA$, then $(A - B)^2 = A^2 - 2AB + B^2$.

6. Let

$$A = \begin{pmatrix} 1 & 1 & -1 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 1 & -1 & 1 \\ 1 & 2 & -1 & 1 \end{pmatrix}.$$

Find elementary matrices $E_1, E_2, \cdots, E_n$, such that $E_n \cdots E_2 E_1 A$ is the reduced echelon form of $A$.

7. Let $A = \begin{pmatrix} 1 & 0 \\ a & 1 \end{pmatrix}$, where $a$ is any number. Find a $2 \times 2$ matrix $B$ such that $BA = I$ and find $AB$.