MATH 260, Homework 8, Spring '14
Due: March 28, 2014
Honor Code: **Name:**

1) (12 pts) Determine if the following sets of "vectors" are linearly independent. Briefly explain your reasoning.

a) $\left\{ \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \right\}$

b) $\left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ -1 \end{bmatrix} \right\}$

c) $\{2t^2 + 1, t, 3t + 4, -t^2\}$

d) $\left\{ \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 1 & 1 \\ 1 & 1 \end{bmatrix} \right\}$

2) (16 pts) For each vector space below, determine if the accompanying set is a basis for it. If it is not, add or remove vectors from the set until your new set is a basis for the vector space. State the dimension of the vector space.

a) $\mathbb{R}^2$; $\quad \left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 3 \\ 4 \end{bmatrix}, \begin{bmatrix} 5 \\ 6 \end{bmatrix} \right\}$

b) $\left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} \,\middle|\, x + y = 0 \right\}$; $\quad \left\{ \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix} \right\}$

c) the set of diagonal 3×3 matrices; $\quad \left\{ \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \right\}$

d) the set of all upper triangular 2×2 matrices; $\quad \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix} \right\}$