Linear Algebra I **Worksheet 2** **Due June 13, 2007**

Name: OUID:

Instructions: Be sure to show as much work as possible, and please make a sincere effort to express your answers clearly and neatly. Please write your answers on your own paper, then staple your pages together using this sheet as a cover sheet.

1. (a) [3 pts] Show that the set of all vectors of the form $\begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix}$, where $c = a + 2b$ and $d = a - 3b$, is a subspace of $\mathbf{R}^4$.

(b) [3 pts] Show that the set of all solutions to the equation $A\mathbf{x} = \mathbf{b}$, where $\mathbf{b} \neq \mathbf{0}$, is not a subspace of $\mathbf{R}^n$.

2. Consider the linear map $L(\mathbf{v}) = A\mathbf{v}$, where $A = \begin{bmatrix} 1 & 3 & 2 & 1 & 1 \\ 1 & 2 & 1 & 1 & 0 \\ 2 & 5 & 3 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 \end{bmatrix}$.

(a) [6 pts] Find a linearly independent set of vectors that span the range of L.

(b) [6 pts] Find a basis for $\mathbf{R}^4$ that contains your vectors from part (a).

3. [3 pts] For what values of t are the vectors $\begin{bmatrix} 1 \\ 3 \end{bmatrix}$ and $\begin{bmatrix} 2 \\ c^2 + 2 \end{bmatrix}$ linearly dependent?