NAME:

Math 3000 Quiz 1 Spring 2012

Instructions: Write your name on your paper. This quiz is to be your own work and the academic honesty policy of the University of Georgia applies. Calculators, books and notes are not allowed.

1. Suppose the vectors $\mathbf{v}$ and $\mathbf{w}$ are both linear combinations of $\mathbf{v}_1, \ldots, \mathbf{v}_k$. Prove that $\mathbf{v} + \mathbf{w}$ is a linear combination of $\mathbf{v}_1, \ldots, \mathbf{v}_k$.

Solution: By definition of linear combination, there exist real numbers $c_1, \ldots, c_k$ and $d_1, \ldots d_k$ such that

$$\mathbf{v} = c_1\mathbf{v}_1 + \cdots c_k\mathbf{v}_k$$
$$\mathbf{w} = d_1\mathbf{v}_1 + \cdots d_k\mathbf{v}_k.$$

Then

$$\mathbf{v} + \mathbf{w} = (c_1 + d_1)\mathbf{v}_1 + \cdots + (c_k + d_k)\mathbf{v}_k.$$

Since $c_1 + d_1, \ldots, c_k + d_k$ are real numbers, $\mathbf{v} + \mathbf{w}$ is a linear combination of $\mathbf{v}_1, \ldots, \mathbf{v}_k$.