Written Assignment 3 : Due Wednesday, February 16

Problem 1: Suppose that $\{\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_n\}$ is a linearly independent set of vectors in $\mathbb{R}^n$ (notice the same n). Explain why $Span\{\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_n\} = \mathbb{R}^n$.

Problem 2: Suppose that $\{\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_k\}$ is a linearly independent set of vectors in $\mathbb{R}^n$. Suppose that c_i and d_i are scalars such that:

$$c_1\mathbf{v}_1 + c_2\mathbf{v}_2 + \cdots + c_k\mathbf{v}_k = d_1\mathbf{v}_1 + d_2\mathbf{v}_2 + \dots d_k\mathbf{v}_k$$

Show that $c_i = d_i$ for all i.

Problem 3: Suppose that $T\colon \mathbb{R}^n \to \mathbb{R}^m$ is a linear transformation. Suppose that $\mathbf{u} \in Span\{\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_k\}$. Show that $T(\mathbf{u}) \in Span\{T(\mathbf{v}_1), T(\mathbf{v}_2), \dots, T(\mathbf{v}_k)\}$.