Math 129a, paragraph homework 01
Due: Mon Jan 28

1. Define the following terms. You can use your own words, or you can use the wording in the text.

   (a) linear combination of vectors

   (b) sum of two matrices

   (c) $\mathcal{R}^n$

2. Below are several true statements. Some facts are true by definition, and some facts are theorems (i.e., need to be proved). For each fact, indicate whether the fact is true by definition or by theorem, and cite the specific definition/theorem in question.

   (a) For vectors $\mathbf{v}, \mathbf{w} \in \mathcal{R}^n$, $\mathbf{v} + \mathbf{w} = \mathbf{w} + \mathbf{v}$.

   (b) If A is an $m \times n$ matrix, and $\mathbf{v}, \mathbf{w} \in \mathcal{R}^n$, then $A(\mathbf{v} + \mathbf{w}) = A\mathbf{v} + A\mathbf{w}$.

   (c) If the vector $\mathbf{v}$ is equal to $\begin{bmatrix} v_1 \\ \vdots \\ v_n \end{bmatrix}$, and A is a $m \times n$ matrix, then $A\mathbf{v}$ is a linear combination of the columns of A.

   (d) If I_n is the $n \times n$ identity matrix, and $\mathbf{v} \in \mathcal{R}^n$, then $I\mathbf{v} = \mathbf{v}$.