Mathematics 189-133B, Winter 2003
Vectors, Matrices and Geometry
Written Assignment 6, due in class, March 14, 2003

Let W_1 and W_2 be subspaces of $\mathcal{R}^n$.

1. Show that the intersection $W_1 \cap W_2$ is a subspace of $\mathcal{R}^n$.
2. Show that, if neither W_1 nor W_2 is a subspace of the other, then the union $W_1 \cup W_2$ is *not* a subspace of $\mathcal{R}^n$.
3. We define the *sum* of the susbspaces as $W_1 + W_2 = \{\vec{w}_1 + \vec{w}_2 : \vec{w}_1 \in W_1, \vec{w}_2 \in W_2\}$. Show that $W_1 + W_2$ is a subspace of $\mathcal{R}^n$.
4. Show that $dim(W_1 + W_2) + dim(W_1 \cap W_2) = dim(W_1) + dim(W_2)$. This result is known as the *modular law*, or *lunch in Chinatown.*