Homework #6: Due on Friday, October 5.

1. Poole, Section 3.2, Problem #32.

2. Poole, Section 3.3, Problem #44.

3. Let V and W be real vector spaces and define $\mathscr{L}(V,W)$ be the set of linear transformations from V to W. We can define a rule for addition and scalar multiplication in $\mathscr{L}(V,W)$ by, for $T, S \in \mathscr{L}(V,W)$ and $c \in \mathbb{R}$,

$$T \oplus S(\mathbf{v}) = T(\mathbf{v}) + S(\mathbf{v}), \quad c \odot T(\mathbf{v}) = cT(\mathbf{v}).$$

   Show that $\mathscr{L}(V,W)$ is a vector space

4. Ever linear transformation in $\mathscr{L}(\mathbb{R}^n, \mathbb{R})$ can be represented by a $1 \times n$ matrix, i.e. by a row vector. Show that the transpose operation $\mathbf{v} \mapsto \mathbf{v}^T$ represents a linear transformation from $\mathbb{R}^n$ to $\mathscr{L}(\mathbb{R}^n, \mathbb{R})$.