Due Monday, Oct. 12 at the beginning of lecture.

1. Section 2.4, Exercise 9.

2. Section 2.4, Exercise 16.

3. Prove or disprove the following statement: the set of invertible linear transformations from $V$ to $W$ is a subspace of $\mathcal{L}(V,W)$.

4. Let $R$ be the rotation in $\mathbb{R}^3$ about the $x$-axis, by $\pi/4$ in the direction from the $y$-axis towards the $z$-axis. Let $S$ be the rotation in $\mathbb{R}^3$ about the $z$-axis, by $\pi/4$ in the direction from the $x$-axis toward the $y$-axis.
   
   (a) Find the matrices with respect to the standard basis in $\mathbb{R}^3$ of $R$, $S$ and $RS$.
   
   (b) Assuming that $RS$ is also a rotation (in fact, it is true that the composite of any two rotations is a rotation), find a vector in the direction of the axis of rotation for $RS$. Hint: such a vector $v$ satisfies the equation $RS(v) = v$.

5. Let $A$ and $B$ be the matrices of the rotations $R$ and $S$ in Problem 2. Find a change of coordinate matrix $Q$ such that $B = Q^{-1}AQ$.

6. Let $V$ be a finite dimensional vector space. Let $\alpha$, $\beta$, $\gamma$ and $\delta$ be ordered bases of $V$.
   
   (a) If the change of coordinate matrices $[I]_\alpha^\beta$ and $[I]_\gamma^\delta$ are equal, does it follow that $\alpha = \gamma$ and $\beta = \delta$?
   
   (b) If $[I]_\alpha^\beta = [I]_\alpha^\gamma$, does it follow that $\beta = \gamma$?
   
   Justify your answers.