Review Problems for Midterm 2

The midterm will cover the material we did in Chapters 3 and 5, through 5.3. (We'll get to 5.4 on the final, don't worry!) Again, I've assigned a portion of the the book's T/F review problems; you are supposed to justify the true statements by calculation or proof, and give a counterexample to the false statements. I've provided a few more review problems, to cover concepts that are not adequately addressed by the book's list of problems. In addition to doing these review problems, you should go over class notes and homework assignments, and make sure that you know the definitions of the basic concepts we've used so far in the class.

Chapter 3: Pages 146-147/1-5, 7-14, 16-18, 20, 22,23, 25-28, 30,31,33,35-37, 41,25,50,51. (In case you hadn't picked up on this, these are all the problems that don't have the word 'similar' in them!)
Chapter 5: Pages 240-241/1-13, 15-19, 21–34, 39, 41 (see problem 4 below), 43.

Additional problems:

1. Give the coordinates of the vector $\begin{bmatrix} -1 \\ 2 \\ 2 \end{bmatrix}$ with respect to the basis for $\mathbb{R}^3$ described in problem 20 from the chapter 3 list. Do the same for an arbitrary vector $\begin{bmatrix} a \\ b \\ c \end{bmatrix}$
2. I know this was a homework problem, but review the proof of the following: if V and W are subspaces of $\mathbb{R}^n$, then the intersection $V \cap W$ is a subspace of $\mathbb{R}^n$.
3. As we've referred to in class, suppose that V is a subspace of $\mathbb{R}^n$, and let $V^\perp$ be the set of vectors that are orthogonal to *every* vector in V. Show that $V^\perp$ is a subspace of $\mathbb{R}^n$.
4. Show that if A is an $n \times n$matrix, then $\frac{1}{2}(A + A^T)$ is symmetric.