UH - Math 4377/6308 - Dr. Heier - Fall 2010
HW 3
Due 09/15, at the beginning of class.

Use regular sheets of paper, stapled together.
Don't forget to write your name on page 1.

1. (1 point) Section 1.3, Problem 18.

2. Let $W_1 = \{(a_1, a_2, a_1 + a_2) | a_1, a_2 \in \mathbb{R}\} \subset \mathbb{R}^3$.

(a) (1 point) Give an example of a subspace W_2 such that $W_1 \oplus W_2 = \mathbb{R}^3$. Justify your answer.

(b) (1 point) Let $W_2 = \{(a_1, a_1 + a_2, a_2) | a_1, a_2 \in \mathbb{R}\} \subset \mathbb{R}^3$. Is $W_1 \oplus W_2 = \mathbb{R}^3$? Is $W_1 + W_2 = \mathbb{R}^3$? Justify your answer.

3. (1 point) Section 1.4, Problems 2(c), 2(e), and 2(f).

4. (1 point) Section 1.4, Problems 3(c), and 3(d).

5. (1 point) Which vectors (a, b, c) are in $\text{span}(\{(2, 1, 4), (1, 0, 1), (3, 1, 5)\})$?

6. (1 point) Section 1.4, Problem 12.

7. (1 point) Section 1.5, Problem 1. (Just say true or false, no further explanation necessary.)

8. (1 point) Section 1.5, Problem 3.

9. (1 point) Can 8 vectors in $\mathbb{R}^7$ be linearly independent? Justify your answer with an argument about solutions of homogeneous systems of linear equations.

10. (1 extra credit point) We saw in class that the set of functions $V = \{f : \mathbb{R} \to \mathbb{R}\}$ is a vector space. Give two subspaces W_1, W_2, each not the zero vector space, such that $W_1 \oplus W_2 = V$. Justify your answer carefully.