

## HOMEWORK 1 (MATH 115A, SPRING 2013)

**Read:** Friedberg, sections 1.1, 1.2, 1.3, and 1.4.

**Solve:** problems

- 4 b,d,f, 6, 11, 18 (Section 1.2)
- 2 b,d,f, 5, 8 b,d,f, 12, 21 (Section 1.3)
- 2 b,d,f, 3 b,d,f, 4 b,d,f, 5 b,d,f,h, 10, 15 (Section 1.4)

and the following three:

**I.** Suppose  $V$  is a vector spaces,  $x, y \in V$ . Use axioms of vector space to prove that  $(5x + 7y) \in V$ , and that  $(5x + 7y) - (13x - 2y) = -8x + 9y$ . What is the total number of different axioms used in each case?

**II.** Suppose  $V$  is a vector space,  $W$  is a subspace of  $V$ , and  $U$  is a subspace of  $W$ . Prove that  $U$  is a subspace of  $V$ .

**III.** Suppose  $x_1, x_2, x_3, x_4 \in V$  are vectors in the vector space  $V$ . Let  $W_{12} = \text{span}(x_1, x_2)$ ,  $W_{123} = \text{span}(x_1, x_2, x_3)$ . Prove that  $W_{12}$  is a subspace of  $W_{123}$ . Find an example when  $x_4 \notin W_{123}$ .

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This Homework is due Wednesday April 10, at 12:59:59 pm. (right before class). Please read the collaboration policy on the course web page. Make sure you write your name in the beginning and your collaborators' names at the end.

You must **box** all answers. Remember that answers are not enough, you also need to prove the results, i.e. provide an explanation exhibiting your logic.

P.S. Some of these book problems are harder than others. Some are plain hard. Some have hints at the end of the book. All problems out of 10.