HOMEWORK 2 (MATH 115A, SPRING 2013)

Read: Friedberg, sections 1.5, 1.6

Solve: problems
• 2 b,d,f,h,j, 3, 8 a, 13 (the field is $\mathbb{R}$), 18 (Section 1.5)
• 2 b,d, 3 b,d, 6 (only the $2 \times 2$ matrices over $\mathbb{R}$ part), 8, 10 b,d, 11, 16 (assume that $n = 4$ here) (Section 1.6)

and the following three:

I. Let $V = \mathbb{R}^3$. a) Find 4 vectors such that every three of them form a basis. b) Find 5 vectors such that every three of them form a basis.

II. Suppose $S = \{v_1, v_2, v_3\}$ is a basis of $V = \mathbb{R}^3$. Prove that $\{-3v_2 + v_3, v_1 - v_3, v_1 + v_3\}$ is also a basis of $V$.

III. Find dimension and a basis in each of the following vector spaces:
   a) $V = \{f(x) = ax^3 + bx^2 + cx + d, f(1) = 0\}$
   b) $V = \{f(x) = ax^3 + bx^2 + cx + d, f'(2) = 0\}$
   c) $V = \{f(x) = ax^3 + bx^2 + cx + d, f(-1) = 0, f(1) + f'(2) = 0\}$
   d) $V = \{f(x) = ax^3 + bx^2 + cx + d, f'''(-1) = 0\}$
   e) $V = \{f(x) = ae^x + be^{2x} + ce^{3x}, f(0) = 0\}$
   f) $V = \{f(x) = ae^x + be^{2x} + ce^{3x}, f(0) = 0, f'(0) = 0\}$

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This Homework is due Wednesday April 17, at 12:59:59 pm. (right before class, no delays allowed even by 1 minute).

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.