

MATH 3500(H)
PROBLEM SET #2

DUE Wednesday, September 3, 2014.

Problems to work but not hand in:

§1.3: #7, 8.

§1.4: #1b,f,g,h,k,l, 5b,e, 8, 12, 13, 17, 19, 23b,e,g,j,k, 24, 31, 32, 35.

Problems to turn in:

WeBWork Homework 2

§1.3: #6 (3), 9* (2), 10 (2).

A. (3) Let $\mathbf{A} = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}$ and set $V = \{\mathbf{x} \in \mathbb{R}^3 : \mathbf{A} \cdot \mathbf{x} = 0\}$. Prove that

$$V = \text{Span} \left(\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ -2 \end{bmatrix} \right).$$

§1.4: #2[†] (2), 4a (2), 10 (3), 15 (3), 25 (1), 30 (2), 33 (2).

B. (4) Suppose A is a square matrix satisfying the equation $A^3 = 2I$. Prove that A , $A + I$, and $A - 2I$ are all invertible. (Hint: Give explicit formulas—in terms of A , of course—for their inverses. In the case of the latter ones, think about how you might figure out how to factor $x^3 \pm y^3$.)

Challenge problems (Turn in separately):

§1.3: #12 (3).

§1.4: #22 (4), 37 (3).

*Recall that to prove that $X \subset Y$, you must show that whenever $x \in X$, it follows that $x \in Y$.

[†]Hint: What earlier homework problem is relevant?