

# Homework 10–21-241 Lec3, Matrices and Linear Transformations

Name: \_\_\_\_\_  
Section: \_\_\_\_\_

**Instructions:** Complete the following problems, clearly labeling the problems. Staple this sheet, with your name and section filled in, to the top of your work. Failure to attach this sheet will result in a three-point deduction in the grade. The assignment will be graded out of fifty points.

**DUE: April 28, 2017**

## Book Problems

- Section 6.4: 4, 16, 20, 22, 34, 35
- Section 6.5: 6, 8, 12, 24, 32, 33, 34

## Other Problems

1. Let  $V$  and  $W$  be vector spaces over the same field of scalars and let  $L : V \mapsto W$  be linear. Prove that  $L(V)$  is a subspace of  $W$  and  $\ker L$  is a subspace of  $V$ .
2. Show that isomorphism is an equivalence relation. That is, for vector spaces  $V$ ,  $W$ , and  $U$  over the same scalar field, show that
  - (a)  $V \cong V$ ,
  - (b) if  $V \cong W$ , then  $W \cong V$ , and
  - (c) if  $V \cong W$  and  $W \cong U$ , then  $V \cong U$ .

**Note:** Since no claim is made about the spaces having finite dimension, you cannot invoke Theorem 6.25.