

## Exercises for Week 7

The work handed in should be entirely your own. You can consult the textbook and/or the class notes but nothing else. To receive full credit, justify your answer in a clear and logical way. Due Oct. 27th.

**Reading.** Read Sections 3.2–3.4 of the textbook carefully.

1. Section 3.1 Exercise 1, 2, 5
2. Section 3.2 Exercise 1, 2 (a) (d) (e), 3, 5 (b), (c), (f), 7, 15, 18, 21.
3. Section 3.3 Exercise 1, 2 (a) (c) (e), 5, 6, 8
4. Prove the following statement.

In class, we discussed the rank of post-composing with an isomorphism. In this exercise, show that the nullity doesn't change either by precomposing with an isomorphism.

Let  $T : U \rightarrow V$  be a linear map over  $\mathbb{F}$  and  $S : U' \rightarrow U$  be an isomorphism. Show that  $S$  restricts to an isomorphism

$$S : \text{Ker}(T \circ S) \rightarrow \text{Ker}(T).$$

In particular,  $n(T) = n(T \circ S)$ .

5. Section 3.4 Exercise 1, 2 (a) (d) (h), 3