

Reminder: Exam #1 will take place in class on Monday, October 8, on the material covered in class up through Monday, October 1, and the related material on homeworks.

Read Hoffman and Kunze, Chapter 3, Sections 2 and 3.

1. From Hoffman and Kunze, Chapter 3, do these problems:

Pages 73-74, #9,12. Page 83, #1,3. Pages 85-86, #1,6.

2. Let $T : \mathbb{R}^n \rightarrow \mathbb{R}^n$ be a linear transformation. Show that the kernel of T is contained in the kernel of $T^2 = T \circ T$. Can the two kernels ever be equal? Can they ever be unequal? Explain (with examples).

3. For each of the following, either give an example or explain why no such example exists:

a) A linear transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ whose kernel is one-dimensional.

b) A linear transformation $T : \mathbb{R}^4 \rightarrow \mathbb{R}^3$ whose kernel is trivial.

c) A linear transformation $T : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ taking $(1, 2, 3)$ to $(4, 5)$.

4. Let A be a 2×3 matrix. Show that there cannot be any 3×2 matrix B such that BA is the 3×3 identity matrix. But also show that (depending on A) it may be possible to find a 3×2 matrix B such that AB is the 2×2 identity matrix.