

Math 244 – Linear Algebra
Spring 2004, Prof. Frechette
Review Sheet for Exam 2

As with the first exam, this will test two basic components to the course. The first component is the material: Do you know the definitions and basic properties of key concepts, and can you use your knowledge to solve problems? The second component is a kind of fluency: can you apply your knowledge in new situations?

Expect that some questions on the test will be routine, while others will require more thought. Routine questions could ask you to do something that shows your knowledge of a definition. You should be able to answer these kinds of questions quickly, so that you will have ample time for the harder questions. NOTE: While some questions will require you to prove something, there will be no questions on the order of the most difficult homework problems. In a timed exam, you have only a short time per question, both to come up with an answer and to write it down clearly. This is very different from having a week to think about the problems. (I will prepare a 50-minute exam, but you may take up to the full 2-hour time period.)

Major Concepts to be Tested

- Basis and dimension: the definitions; determining whether a given set is/isn't a basis for a given vector space; properties of bases and dimension; (from 1.6).
- Linear transformations $T : V \rightarrow W$ from one vector space to another: the definition; determining whether or not a given map is a linear transformation; key examples like the ones from Discussion 2 and the homework (from 2.1).
- The matrix of a linear transformation: finding said matrix with respect to given choices of bases; how to get back and forth between the matrix notation and standard mapping notation; the properties of these matrices (from 2.2).
- Kernel and image of a linear transformation: determining $\text{Ker}(T)$ and $\text{Im}(T)$ when you know the matrix for T ; using the kernel and image to determine whether a linear transformation is 1-1, onto, both, or neither (from 2.3).
- The Dimension Theorem and its consequences (from 2.3 and 2.4).
- Compositions of linear transformation: determining the matrix of a composition given the matrices of the individual linear transformations; behavior of 1-1 and onto properties under composition (from 2.5).

Review Problems

- Supplementary Exercises (p. 59): 2, 3, 9.
- Supplementary Exercises (p. 130): 1acdefj, 2-4, 5, 8-10, 12, 13.
- Section 1.6: # 2, 4, 5, 14, 15.
- Section 2.1: # 3, 4, 10.
- Section 2.2: # 3, 5, 8, 11, 13.
- Section 2.3: # 1ade, 3ab, 4ab, 5, 8.
- Section 2.4: # 1-2, 4 (choose a few parts), 5, 6, 12.
- Section 2.5: # 1cd, 5, 6, 8, 9, 12, 13.