

Study Guide for Exam 4

In what follows is a **brief** synopsis of what we have covered in Sections 5.1–5.3, 7.1–7.3. Use this list a guide to help you make up your own study guide.

On the exam, you can expect several proofs, TRUE/FALSE questions, and give-an-example-of type questions. The problems that have been assigned in class (but not necessarily collected) or very similar problems could appear on the exam; therefore it is **highly** recommended that you make every effort to complete those problems. In addition, you might try the problems listed below in the Chapter 5, 6 & 7 Review Sections.

Chapter 5 Review, pp. 355–356: 1–17, 19, 22, 23, 26, 27, 20, 31, 34, 38, 39, 41, 42

Chapter 7 Review, pp. 547–548: 1–3, 9, 10, 13–16, 19–26, 49

To prepare for this test, you should make sure that you have done each of the following:

- **Rewritten your class notes.** Anything that I asked you to finish, make sure you know how to finish it. You should understand all of the proofs and be able to apply the techniques used in class to similar problems.
- **Tried all of the homework problems,** even the ones that are not collected. Just because a problem was not collected does NOT mean that it is unimportant. Similar questions could appear on the exam.

For the Final: You should review all previous study guides, your notes, previous exams, homework quizzes, and assigned problems. I would suggest that you do this in the order listed above.

Exam 4 Topics:

1. Definition of eigenvalue and eigenvector.
2. Definition of the characteristic equation.
3. Finding eigenvalues and eigenvectors either given the characteristic equation or by finding the characteristic equation.
4. Find the eigenspace associated with an eigenvalue.
5. Eigenvalues of upper or lower triangular matrices.
6. Eigenvalues and similar matrices.
7. Definition of diagonalizable.
8. Determining if a matrix is diagonalizable.

9. Definition of a vector space.
10. Examples of vector spaces.
11. Properties of vector spaces (Theorem 7.2).
12. Definition of subspaces and showing that a given subset of a vector space is a vector space.
13. Linear combinations in vector spaces.
14. Definition of span in a vector space.
15. Definition of linear transformation between vector spaces.
16. Definition of one-to-one and onto linear transformations.
17. Deciding if the given linear transformation is an isomorphism.
18. Linearly independent and dependent in vector spaces.
19. Basis for a vector space or subspace.
20. Finite and infinite dimensional vector spaces.