Math 175, Spring 2008
H. Jordon

Study Guide for Exam 3

In what follows is a **brief** synopsis of what we have covered in Sections 3.1, 3.2, 4.1–4.5. 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 3 & 4 Review Sections and Sample Exams.

Chapter 3 Review, pp. 196–197: 1–11, 13, 18, 23, 25, 28, 38, 41

Chapter 4 Review, pp. 248–250: 1–24, 27, 29–39, 41, 49, 51

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.

Exam 3 Topics:

1. (i, j)-cofactors of matrices.
2. Definition of the determinant of a matrix (using the cofactor expansion).
3. Calculating the determinant using a cofactor expansion across any row or down any column (Theorem 3.1).
4. Determinants of upper or lower triangular matrices (Theorem 3.2).
5. Determinants of elementary matrices (Theorem 3.3).
6. Properties of determinants (Theorem 3.4).
7. Definition of a subspace and showing a given set is a subspace using the definition.
8. The span of any set of vectors is a subspace (Theorem 4.1).
9. Definition of a basis of a subspace.

10. Definition of the null space, column space, and row space of a matrix and finding bases for any of these subspaces.
11. Finding bases for the range and null space of a linear transformation.
12. Every finite spanning set S of a subspace V can be extended to a basis (Theorem 4.3).
13. Every linearly independent set subset of a subspace contains a basis; every subspace has a basis; any two bases for a subspace contain the same number of vectors (Theorems 4.4 & 4.5).
14. Definition of the dimension of a subspace.
15. Finding the dimension of subspaces associated with a matrix or linear transformation.
16. Given a basis $\mathcal{B}$ of $\mathbb{R}^n$ and a vector $\mathbf{v}$, finding the $\mathcal{B}$-coordinate vector of $\mathbf{v}$ (Theorem 4.11), denoted $[v]_{\mathcal{B}}$.
17. Given a linear operator T and basis $\mathcal{B}$, finding the unique matrix representation of T with respect to $\mathcal{B}$ (Theorem 4.12), denoted $[T]_{\mathcal{B}}$.