

Math 115AH Linear Algebra. Review for Midterm 1

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Review for Midterm 1, Friday, October 23.

The exam will cover sections 2.1 to 2.4 in the book (Hoffman-Kunze). Since Math 33A is a prerequisite for this course, you are also expected to know the main results of 1.1 to 1.6.

Make sure that you know the statements of the main results. You should also know the main definitions precisely. For example, suppose that $v_1, \dots, v_n \in V$, where V is a vector space over a field F . A question might ask you to define the statement “ v_1, \dots, v_n are linearly dependent”. Your answer should be some variant of:

v_1, \dots, v_n are linearly dependent if there exist $c_1, \dots, c_n \in F$ such that

$$c_1v_1 + \dots + c_nv_n = 0 \in V$$

and there is an i such that $c_i \neq 0$.

There may be “prove or give a counterexample” questions on the exam. To see the sort of proof expected, make sure you understand all the homework problems in homework sets 1 to 3. At least one problem will be taken from the homework, possibly with minor variations.

You should know about fields, vector spaces, functions as vectors, linear independence and spanning, bases, coordinates, $[v]_{\mathcal{B}}$. For problems involving some computation, you should be able to carry out Gaussian elimination to describe the solutions of a set of linear equations. (Gaussian elimination is also called row reduction, as in section 1.4.) Any computations in the exam won't be too big, since the exam is only 50 minutes.

You may need to check whether a given matrix is invertible and (if so) compute the inverse. You can do that by any method you like, as long as it is correct. The first method of computing inverses in the book uses Gaussian elimination (Example 16 in section 1.6).