

FINAL REVIEW  
Linear Algebra–Block 5, 2013

The exam will be available at 8AM on Wednesday morning, and due by 1PM. I believe the exam is comparable to the Midterm in length. The Honor Code rules are: no help from other people, and no books or notes except one 8-1/2" x 11" paper with writing on both sides that you prepared for yourself before the exam. You will not be allowed to use a calculator or computer, but I will try to make the arithmetic easy.

List of sections/material covered:

Material in Chapters 1-3 will be covered more lightly, mostly as necessary background for the material since the Midterm.

Chapter 1 (1.1-1.5, 1.7-1.9): Know row reduction, vector parametric form of solutions, how nonhomogeneous solutions relate to homogeneous, free variables and pivots, existence and uniqueness of solutions, linear combinations, span, independence, linear transformations and how to find their matrices, 1-1 and onto.

Chapter 2 (2.1-2.3): Know matrix operations (addition, scalar multiplication, matrix multiplication), transpose, inverse, many characterizations of an invertible matrix.

Chapter 3 (3.1-3.2): Know how to find determinants, simple properties, relationship to invertible.

Chapter 4 (4.1-4.6,4.9): Know vector spaces and subspaces, linear transformations on abstract spaces, 1-1 and onto, nullspace, column space, row space, range, kernel, linear independence and spanning in abstract spaces, basis, dimension, rank, coordinate vectors and change of coordinates matrix, Markov chains.

Chapter 5 (5.1-5.3, 5.6): Know eigenvalues, eigenvectors, characteristic equation, similarity of matrices, diagonalization, discrete dynamical systems.

Chapter 6 (6.1-6.3, 6.5 through p 363): Know inner product, length, orthogonality, orthogonal complement, orthonormal basis, orthogonal matrix, orthogonal projection, best approximation, least squares solution.

Sample problems:

1. Questions on the exam will include True/False, with requirement to give a justification of your answer. For practice see p 262 #1a-s, p326 #1, and p. 390#1
2. The exam will include a simple proof. For practice, p. 161 # 13; p. 262, #4; p. 326 #2, 3
3. The exam will include some computations, an applied problem, and checks on your understanding of definitions and theorems (you will not be asked to give a formal definition or state a theorem, just to use them correctly. For practice, p. 47 #17; p. 78 #11; p 229 #24; p238 # 30; p262 #2, 9; p310 # 17ab; p 326 #18; p 390 #11