MATH 260, Linear Systems and Matrices, Fall '14
Final Study Goals

This is a list of learning goals you should be able to demonstrate that you have achieved on the final. This is not a complete list of all topics the final could cover. All topics for the final will be pulled from the reading (sections 3.1-3.6, 5.3-5.4 of the book), the videos, the homework and activities. The major focus of the questions will be material from Weeks 7-12 (after midterm), but you still must know the material from Weeks 1-6 as the later material relies on it.

1. Be able to identify a vector space

2. Be able to calculate linear combinations and multiples of vectors

3. Be able to verify or disprove a set as a subspace by using The Subspace Theorem

4. Be able to give non-trivial subspaces of common vector spaces

5. Be able to determine if a set of vectors is linearly independent

6. Be able to explain the span of a set, the relationship between span and the basis of a vector space

7. Be able to determine if a set of vectors is a basis for a vector space

8. Be able to find a basis for a subspace

9. Be able to find the dimension of a subspace

10. Be able to find the null space of a matrix

11. Be able to give the column space for a matrix

12. Be able to give a basis for the null space and for the column space of a matrix

13. Be able to describe how the null space and column space relate to each other

14. Be able to use the Rank-Nullity theorem

15. Be able to calculate the eigenvalues and eigenvectors of a matrix

16. Be able to identify several properites of eigenvalues/vectors

17. Be able find eigenspaces

18. Be able to find eigenvectors for repeated eigenvalues

19. Understand how repeated eigenvalues and their eigenvectors affect dimension of subspaces

20. Be able diagonalize a matrix

21. Be able to identify matrices that cannot be diagonalized

22. Be able to use the diagonalization of a matrix to find a matrix power

Old goals from midterm:

1. Be able to perform basic matrix-scalar operations (such as matrix addition, matrix multiplication, etc.).

2. Be able to transpose a matrix.

3. Be able to convert from a system of equations to a (augmented) matrix, and back.

4. Be able to perform elementary row operations on a matrix.

5. Be able to identify row echelon form (REF), and be able to manipulate a matrix to be in REF.

6. Be able to identify reduced row echelon form (RREF) and manipulate a matrix to be in RREF.

7. Be able to state the number of solutions (and find them) to a system, based on its RREF.

8. Be able to tell what the rank of a matrix is.

9. Know what the implications of a square matrix not having full rank are.

10. Be able to find the inverse of a matrix.

11. Be able to identify several characteristics of an invertible matrix.

12. Be able to state the number of solutions to a matrix-vector equation, based on invertibility.

13. Be able to determine when a matrix has no inverse.

14. Be able to find the determinant of a matrix (up to 4×4, but understand how it would work beyond).

15. Be able to find the 'minor' and 'cofactor' of elements in a matrix.

16. Discover several properties of determinants including if a matrix has an inverse.