MATH 3A MIDTERM REVIEW

1. DEFINITIONS, CONCEPTS, AND THEOREMS

Row echelon form and row reduced echelon form, linear independence/dependence of vectors, parametric solution of a linear system, linear transformations and related notions (domain, range, codomain, one-to-one, onto), matrix operations (addition, scalar/matrix multiplication, transpose, and inverse) and elementary matrices.

Theorem 4 in Section 1.4, Theorem 7 in Section 1.7, Theorem 10 in Section 1.9, algorithm for deciding if A is invertible and Theorem 7 of Section 2.2., the Invertible Matrix Theorem (in Section 2.3).

Read through the concepts, theorems above carefully. Make sure you understand exactly what they say. These things will help you with T/F and multiple choice questions.

2. TOPICS AND PROBLEMS

2.1. COMPUTATIONAL

1. Solving systems of linear equations and matrix equations $A\vec{x} = \vec{b}$ (row reduction to REF, determining whether the system has solutions/has no solutions/has unique solutions based on the pivots of REF).

2. Converting matrix equations of the form $A\vec{x} = \vec{b}$ into a system of linear equations and to a vector equation and vice versa.

3. Determining if a set of vectors $\{v_1, \ldots, v_n\}$ is linearly independent and if a vector v is in the span of other vectors (e.g. Problems 1-14 in Section 1.7).

4. Being able to express solutions to $A\vec{x} = \vec{b}$ in parametric form (Theorem 6 of Section 1.5).

5. Computing the standard matrix for a given linear transformation T (see Theorem 10 of Section 1.9).

6. Computing basic matrix operations (addition, transpose, multiplication), and inverse A^{-1} (using row reduction, see Theorem 7 of Section 2.2).

In general, I would suggest working through these computational problems again (perhaps redo some problems from the homework and do similar problems from the book) to make sure you are fluent with the calculations and minimize making the mistakes.

2.2. CONCEPTUAL

1. Conceptual problems regarding linear dependence/independence (e.g. relevant homework problems and problems 33-40 in Section 1.7).

2. Showing some function T is a linear transformation (example 4 in Section 1.8 and relevant problems in the same section) and showing if a function/linear transformation T is one-to-one, onto (see Theorem 12 Section 1.9).

3. Applications of invertible matrix theorem (e.g. 13-33 of Section 2.3).