MATH 54 - MIDTERM 1 STUDY GUIDE

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Note: 1.3.4 means 'Problem 4 in section 1.3'

1. COMPUTATIONAL QUESTIONS

- Solve a system of equations, or determine if there are no solutions. Try to write your solutions in vector form. (1.1.11, 1.1.13, 1.2.11, 1.2.13, 1.4.11, 1.5.1, 1.5.5, 1.5.9).
- Determine if a given vector $\mathbf{b}$ is a linear combination of other vectors (1.3.11, 1.3.13)
- Determine whether a set of vectors is linearly dependent or independent (1.7.1, 1.7.5, 1.7.7, 1.7.11, 1.7.15, 1.7.17)
- Given a linear transformation T and a vector $\mathbf{b}$, determine whether $\mathbf{b}$ is in the image of T (1.8.3, 1.8.9, 1.8.11)
- Find the matrix of a given linear transformation T (1.9.1, 1.9.3, 1.9.5, 1.9.9, 1.9.11, 1.9.17)
- Given A and B, find AB, or say 'it does not exist' (2.1.5, 2.1.6, 2.1.9)
- Find the inverse of a matrix A (2.2.1, 2.2.3, 2.2.31, 2.2.33, 2.3.1, 2.3.3, 2.3.4, 2.3.7)
- Use a given LU factorization of A to solve the equation $A\mathbf{x} = \mathbf{b}$ (2.5.1, 2.5.3, 2.5.5)
- Given A, find a basis for $Nul(A)$ and find a basis for $Col(A)$ (2.8.23, 2.8.25, also look at 2.8.7, 2.8.9)

2. TRUE/FALSE EXTRAVAGANZA

Do the following set of T/F questions: 1.5.24, 1.7.21, 1.7.22, 1.9.23, 1.9.24, 2.1.15, 2.8.21 (check out the hints to HW 1,2,3 for solutions)

3. CONCEPTUAL QUESTIONS

Understand the following concepts:

- Pivots (1.2.23, 1.2.24, 1.2.25, 1.2.26, 1.5.29, 1.5.31)
- Span (1.3.22, 1.3.25, 1.4.17, 1.4.29, 1.4.34)
- Linear independence (1.7.33, 1.7.34, 1.7.35, 1.7.36)
- Invertible matrices (2.1.23, 2.1.24, 2.2.11, 2.2.19, 2.2.21)
- Implications of invertibility (2.3.11, 2.3.15, 2.3.17, 2.3.21, 2.3.24, 2.3.30). **Understand the 12 equivalent definitions of invertibility (Theorem 8)**
- Subspace, Basis (2.8.1, 2.8.3, 2.8.5, 2.8.7, 2.8.17)

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