Math 2174, Review #1

1. **IMPORTANT CONCEPTS AND SAMPLE PROBLEMS**

(1) $m \times n$ system of linear equations, Matrix representation of linear system: coefficient matrix, augmented matrix, elementary row operations of matrices (Sect. 1.1)

(2) echelon form, reduced echelon form, reduction to echelon form (Sect. 1.2)

(3) consistent and inconsistent systems, homogeneous systems and trivial/zero solution, non-trivial solution (Sect. 1.3)

(4) matrix operations: addition, scalar multiplication, n-dimensional vectors, Euclidean space $\mathbb{R}^n$, scalar product/dot product of vectors, matrix multiplication (Section 1.5)

(5) Matrix operations, transpose of a matrix, square matrix, zero matrix, identity matrix, symmetric matrix, Euclidean norm/length of vectors, Euclidean distance between vectors (Section 1.6)

(6) Linear dependence/independence of vectors, singular/nonsingular matrices (Sect. 1.7)

(7) Inverse of a matrix (Sec. 1.9)

(8) Supplementary exercises, Pages 105-107: 1, 2, 4, 6, 8, 10, 12, 13

(9) Conceptual exercises, Page 107-108: 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 15

(10) eigenvalue, eigenvector (Sect. 4.1)

(11) determinant of matrix, minor, cofactors, determinant of matrix in terms of cofactor expansions, determinant and singular matrix (Sect. 4.2)

(12) characteristic polynomial of matrix, algebraic multiplicity of eigenvalues, determinant and eigenvalues of upper triangular matrix (Sect. 4.4)

(13) eigenvector, eigenspace, geometric multiplicity of eigenvalues, defective matrix (Sect. 4.5)

(14) complex eigenvalue and eigenvectors (Sect. 4.6)

(15) Similar matrices, diagonalizable matrix, orthogonal matrix, diagonalization of symmetric matrix (Sect. 4.7)

(16) Supplementary exercises, page 350-351: 1, 2, 3, 4, 5, 10, 11, 12, 13, 14

(17) Conceptual matrix, page 351-352: 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14 (a)(b)