MATH 306 Exam I (1.1 - 2.3, 2.8 - 4.7, 5.1 - 5.5, 6.1, 6.2) Review

1. Know the definition of a linear system, solution to a linear system and how to solve a linear system

2. Know how to determine if a solution is exists and if a solution is unique.

3. Know how to recognize echelon forms, vector & matrix equations.

4. Know how to describe the solution sets of homogeneous and nonhomogeneous linear systems.

5. Know how to determine linear independence/dependence of a set.

6. Know the properties of a linear transformation.

7. Know the matrix operations.

8. Know the definition of the matrix inverse and how to find it.

9. Know the invertible matrix theorem.

10. Know the definition of subspace in \mathbb{R}^n .

11. Know how to find the column space and null space of a matrix.

12. Know the define of and how to find the dimension of a subspace and rank of a matrix.

13. Know the definition of determinant and how to find the determinant of a matrix

14. Know the properties of the determinant and how to apply Cramer's rule to find the unique solution of the matrix equation $A\mathbf{x} = \mathbf{b}$.

15. Know the definition of vector spaces and subspaces and be able to determine if a given set with two operations defined is a vector space or subspace.

16. Know how to find a basis for the null space, row space, column space and left null space of a given matrix A.

17. Know how to determine if a set is linearly independent and if a set is a basis for a vector space.

18. Know how to determine coordinate vectors for a vector space and how to find the change-of-coordinates matrix.

19. Know how to find the dimension of a vector space.

20. Know the criteria for a transformation to be a linear transformation and what the kernel and range of a transformation are.

21. Know how to determine the eigenvalues and eigenvectors of a matrix.

22. Know the definition of similar matrices and how to diagonalize an $n \times n$ matrix.

23. Know how to find the matrix of a linear transformation.

24. Know the definition of inner product, norm of a vector, and distance between vectors and how to find each.

25. Know the definition of orthogonal vectors and orthogonal complement of a vector space.

26. Know how to find an orthogonal set/basis and an orthonormal set/basis.

27. Example exercises: Quiz & Homework questions;
Ch.1 Supplementary Exercises, #1 - 25;
Ch.2 Supplementary Exercises, #1 - 10, 13 - 18;
Ch.3 Supplementary Exercises, #1 - 17;
Ch.4 Supplementary Exercises, #1 - 17;
Ch.5 Supplementary Exercises, #1a - i, 2 - 5, 13 - 16;
Ch. 6 Supplementary Exercises, #1a - p, 5.