

Math 313 Exam 2 competencies

Exam Content

This exam will cover material specifically from sections 2.1-2.3, 3.1-3.3, and 4.1-4.4. There will be two types of questions: multiple choice and free response. The format of the exam will be similar to exam 1.

Specific Learning Outcomes for Exam 1

1. Know how to calculate matrix operations, such as scalar multiplication, matrix addition, matrix vector multiplication, and matrix-matrix multiplication. Know the properties.
2. Be able to tell when matrix addition or multiplication is valid.
3. Know the meaning of "Matrix multiplication is not commutative", and be able to give examples.
4. Know how to construct Elementary matrices, and their inverses.
5. Know the theorems on invertible matrices.
6. Know how to find the inverse of a matrix using Gaussian Elimination.
7. Know how to use inverses to solve systems of equations.
8. Know the equivalencies in the Invertible Matrix Theorem.
9. Be able to use the Invertible Matrix theorem to deduce properties about a specific matrix.
10. Know what is meant by an invertible linear transformation.
11. Be able to tell when a linear transformation is invertible and be able to find the inverse transformation.
12. Know what is meant by A_{ij} , and what a cofactor is.
13. Be able to calculate the determinant of any matrix by expansion along a row or column.
14. Be able to calculate the determinant of a triangular or diagonal matrix.
15. Understand how row operations affect the determinant.
16. Be able to calculate the determinant of a matrix using row operations.
17. Understand the theorems regarding determinants.
18. Know what is meant by the adjoint of A .
19. Be able to calculate the inverse from the determinant and the adjoint.

20. Be able to use Cramer's rule to solve a system of equations.
21. Know the ten properties that define a vector space.
22. Be able to determine if a set with a defined addition and scalar multiplication is a vector space.
23. Know the vector spaces defined in class and in the book.
24. Know the properties of a vector space.
25. Know what is meant by a subspace.
26. Be able to determine if a particular subset of a vector space is a subspace.
27. Know the properties of subspaces.
28. Know what is meant by $\text{Nul}(A)$ and $\text{Col}(A)$.
29. Be able to find a basis for both $\text{Nul}(A)$ and $\text{Col}(A)$.
30. Understand what is meant by the kernel and range of a linear transformation and how they relate to the above spaces.
31. Be able to determine if a set of vectors in a vector space is linearly independent or linearly dependent.
32. Know the properties of linearly independent or dependent sets.
33. Know what is meant by a basis.
34. Be able to determine if a specific set in a Vector space is a basis.
35. Know and be able to apply the spanning set theorem.
36. Be able to write any vector in a vector space (not just \mathbb{R}^n) in its coordinate vector from a basis.
37. Be able to construct the change of basis matrix from any basis to the standard basis.
38. Be able to determine properties of vectors in a vector space by examining their coordinates.