

Possible Topics

This is a (not exhaustive) set of possible topics for Exam 2, roughly correlating to sections of the textbook.

The Determinant of a Matrix

1. Know how to compute the determinant of a 2×2 matrix directly.
2. Understand how to use the determinant to determine if a matrix is singular.
3. Be able to compute the determinant of a matrix using the cofactor expansion formula.
4. Know how to easily compute the determinant of a triangular or diagonal matrix.

Properties of Determinants

1. Know how each of the three elementary row operations changes the determinant.
2. Be able to compute the determinant of a product of matrices.
3. Understand how to compute a determinant using Gauss-Jordan elimination.
4. Know how to compute the inverse of a matrix using the adjoint formula.
5. Be able to solve a linear system of equations using Cramer's rule.

Vector Spaces

1. You do not need to know all eight of the vector space axioms, but given a particular axiom, you should be able to determine if a possible vector space satisfies that axiom.
2. Understand the idea of closure under addition and scalar multiplication.
3. Be able to use the alternative vector spaces $\mathbb{R}^{n \times n}$, $C[a, b]$, and P_n .

Subspaces

1. Know how to determine if a subset of a vector space is a subspace.
2. Be able to find the null space of a matrix.
3. Understand how to construct the span of a collection of vectors.
4. Know how to determine if a collection of vectors is a spanning set for a vector space.

Linear Independence

1. Understand how linear independence relates to linear combinations of vectors.
2. Be able to determine if a set of vectors in \mathbb{R}^n is linearly independent.
3. Know how to interpret linear independence geometrically in \mathbb{R}^2 and \mathbb{R}^3 .
4. Understand how to establish linear independence in the space $C[a, b]$.

Review Exercises

These are a few problems from the textbook which, in addition to reviewing the homework, may help you better prepare for the exam.

Section 2.2: 3(e), 4.

Section 2.3: 1(c), 2(c).

Section 3.2: 12(c) (10(c) in the seventh edition).

Section 3.3: 2(b), 9(a) (7(a) in the seventh edition).