Math 725 Advanced Linear Algebra

Final Study Guide

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Topics

1. State the Fundamental Theorem of Algebra. Apply it to Polynomials.
2. Eigenvalues, Eigenvectors, and Invariant Subspaces. Define each. Discuss linearly independent eigenvectors and distinct eigenvalues.
3. Restriction and Quotient(extension) Operators. Define each.
4. Polynomials applied to Operators. Define T^m and $p(T)$. Recall exercise 5B11.
5. Eigenspaces and Diagonal Matrices. Define each. Recall exercise 5C8. Show that if there is a diagonal matrix we can form a spectral subspace for all simular matrices.
6. Inner Product Spaces and Norms. Define and give examples.
7. Orthonormal Bases. Define and show example norm of an orthonormal linear conbination. Write a vector as a linear combination of a orthonormal basis. Be apple to apply Gram-Schimidt to a polynomial.
8. Orthogonal Complements and Minimization (very important). Show direct sum of a subspace and its orthogonal complement. Define orthogonal projection P_U and give example. Recall properites of P_U.
9. Operators on Inner Product Spaces
10. Self-Adjoint and Normal Operators
11. Spectral Theorem (required by syllabus)