Math 307 (Summer 2016)

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Outline

Chapter 1: Linear Equations (8 hours)

Topics: Solving linear equations, vector and matrix norms, condition number.
Applications: Lagrange interpolation, splines, finite difference approximation.

Chapter 2: Subspaces, Basis and Dimension (8 hours)

Topics: Vector spaces, subspaces, basis, dimension, basis for N(A), R(A), $N(A^T)$ $R(A^T)$.
Applications: Graphs and resistor networks.

Chapter 3: Orthogonality (9 hours)

Topics: Orthonormal bases and orthogonal matrices, Complex vector spaces.
Applications: Least squares, Fourier series, discrete Fourier transforms, FFTs.

Chapter 4: Eigenvalues and Eigenvectors (9 hours)

Topics: Eigenvalues and eigenvectors.
Applications: Power method, Markov chains, Anderson tight binding model, Google PageRank, Singular Value Decomposition.

Marking scheme: 15% homework + 35% midterm exam + 50% final exam