

MA322-021 Matrix Algebra

Summer 2009

Chapter 1 – Linear Equations in Linear Algebra

- 1.1 – Systems of Linear Equations
- 1.2 – Row Reduction and Echelon Forms
- 1.3 – Vector Equations
- 1.4 – The Matrix Equation $Ax=b$
- 1.5 – Solution Sets of Linear Equations
- 1.7 – Linear Independence
- 1.8 – Introduction to Linear Transformations
- 1.9 – The Matrix of a Linear Transformation
- 1.6 & 1.10 – Applications*

Chapter 2 – Matrix Algebra

- 2.1 – Matrix Operations
- 2.2 – The Inverse of a Matrix
- 2.3 – Characterizations of Invertible Matrices
- 2.4 – Partitioned Matrices*
- 2.5 – Matrix Factorizations*
- 2.8 – Subspaces of R^n
- 2.9 – Dimension and Rank

Chapter 3 - Determinants

- 3.1 – Introduction to Determinants
- 3.2 – Properties of Determinants*

Chapter 5 – Eigenvalues and Eigenvectors

- 5.1 – Eigenvalues and Eigenvectors
- 5.2 – The Characteristic Equation
- 5.3 – Diagonalization*
- 5.5 – Complex Eigenvalues*
- 5.7 – Applications to Differential Equations*

Chapter 4 – Vector Spaces

- 4.1 – Vector Spaces and Subspaces
- 4.2 – Null Spaces, Column Spaces, and Linear Transformations
- 4.3 – Linearly Independent Sets; Bases
- 4.4 – Coordinate Systems*
- 4.5 – The Dimension of a Vector Space
- 4.6 – Rank
- 4.7 – Change of Basis

Chapter 6 – Orthogonality and Least Squares

- 6.1 – Inner Product, Length, and Orthogonality
- 6.2 – Orthogonal Sets
- 6.3 – Orthogonal Projections
- 6.4 – The Gram-Schmidt Process
- 6.5 – Least Squares Problems*
- 6.7 – Inner Product Spaces*
- 6.8 – Applications of Inner Product Spaces*

Chapter 7 – Symmetric Matrices and Quadratic Forms

- 7.1 – Diagonalization of Symmetric Matrices
- 7.2 – Quadratic Forms*
- 7.3 – Constrained Optiminazation

Starred (*) topics are tentative and subject to time constraints.