

M 340L-CS Material

from Lay, David C. *Linear Algebra and Its Applications* (4th Edition) Pearson.

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 Systems
- 1.7 Linear Independence
- 1.8 Introduction to Linear Transformations
- 1.9 The Matrix of a Linear Transformation

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
- 2.8 Subspaces of $\mathbb{R}^n$
- 2.9 Dimension and Rank

Chapter 3 *Determinants*

- 3.1 Introduction to Determinants

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
- 4.5 The Dimension of a Vector Space
- 4.6 Rank

Chapter 5 *Eigenvalues and Eigenvectors*

- 5.1 Eigenvectors and Eigenvalues
- 5.2 The Characteristic Equation
- 5.3 Diagonalization
- 5.4 Eigenvectors and Linear Transformations
- 5.5 Complex Eigenvalues
- 5.8 Iterative Estimates for Eigenvalues

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