

# MATH 5 Lecture Notes

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Tuesday, 14 January, 2025

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# 1 Chapter 1

## 1.1 Systems of Equations

$$\left[ \begin{array}{cc|c} a & b & c \\ c & d & e \end{array} \right]$$



1.2 Row Reductions and Echelon Form

1.3 Vector Equations

1.4 The Matrix Equations  $Ax=b$

1.5 Solution Sets for Linear Systems

1.6 Linear Independence

1.7 Linear Transformations

1.8 The Matrix of a Linear Transformation

## 2 Chapter 2

2.1 Matrix Operations

2.2 The Inverse of a Matrix

2.3 Characterizations of Invertible Matrices

## 3 Chapter 3

3.1 Introduction to Determinants

3.2 Properties of Determinants

3.3 Cramer's Rule and Linear Transformations

## 4 Chapter 4

4.1 Vector Spaces and Subspaces

4.2 Null Spaces and Column Spaces

4.3 Linear Independence

4.4 Coordinate Systems

4.5 Dimension and Rank

4.6 Change of Basis

## 5 Chapter 5

5.1 Eigenvectors and Eigenvalues

5.2 The Characteristic Equations

5.3 Diagonalization

5.4 Eigenvectors and Linear Transformations

5.5 Complex Eigenvalues

5.6 Discrete Dynamical Systems

5.7 Applications to Markov Chains

## 6 Chapter 6

6.1 Inner Product Spaces

6.2 Orthogonal Sets

## 7 Example Problems with Solutions