

MATH-332: Linear Algebra

Chapter: 2

Matrix AlgebraSection 2.2: The Inverse of a Matrix

pgs. 118-126

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Lecture: The Inverse of a Matrix

<b>Topics:</b>	Theorem 4, 5, 6
	Elementary Matrices
	Finding $A^{-1}$
<b>Problems</b>	Prac: 1, 2
	Prob: 8, 11, 13, 21, 23, 35

**Section Goals**

- Understand the definition and properties of a matrix inverse for square data and how this can be used to characterize solutions to  $\mathbf{Ax} = \mathbf{b}$ .
- Devise a method for finding a matrix inverse using elementary row-operations.

**Section Objectives**

- Define the inverse matrix for square data and its associated special case for  $\mathbf{A} \in \mathbb{R}^{2 \times 2}$ .
- Prove theorem 5, which states that for invertible  $\mathbf{A} \in \mathbb{R}^{n \times n}$  there exists a unique solution to  $\mathbf{Ax} = \mathbf{b}$ .
- Prove some of the properties of inverse matrices found in theorem 6 highlighting the change from element level proofs to algebraic proofs on the matrices themselves.
- Define elementary matrices in connection to row-operations applied to identity matrices and prove how these matrices can be used to define  $\mathbf{A}^{-1}$ , theorem 7, thus giving an algorithm for finding an inverse matrix - assuming one exists.