

Section 8.3 The Inverse of a Square Matrix

Objective: In this lesson you learned how to verify that two matrices are inverses of each other and find inverses of matrices and how to use inverse matrices to solve systems of linear equations.

Course Number

Instructor

Date

Important Vocabulary

Define each term or concept.

Inverse of a matrix

I. The Inverse of a Matrix (Pages 582–583)

To verify that a matrix B is the inverse of the matrix A , . . .

What you should learn

How to verify that two matrices are inverses of each other

If a matrix A has an inverse, A is called _____ or **nonsingular**. Otherwise, A is called _____.

To have an inverse, a matrix must be _____. Not all square matrices have inverses. However, if a matrix does have an inverse, that inverse is _____.

II. Finding Inverse Matrices (Pages 584–585)

To find the inverse of a square matrix A of order n , . . .

What you should learn

How to use Gauss-Jordan elimination to find the inverses of matrices

Example 1: Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 4 \\ 1 & 0 & 2 \\ 2 & 3 & 6 \end{bmatrix}$.

III. The Inverse of a 2×2 Matrix (Page 586)

If A is a 2×2 matrix given by $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then A is invertible if and only if _____. Moreover, if this condition is true, the inverse of A is given by:

$$A^{-1} = \frac{\quad}{\quad} \begin{bmatrix} \quad & \quad \\ \quad & \quad \end{bmatrix}$$

The denominator is called the _____ of the 2×2 matrix A .

Example 2: Find the inverse of the matrix $B = \begin{bmatrix} 3 & 9 \\ -2 & -7 \end{bmatrix}$.

What you should learn

How to use a formula to find the inverses of 2×2 matrices

IV. Systems of Linear Equations (Page 587)

If A is an invertible matrix, the system of linear equations represented by $AX = B$ has a unique solution given by _____.

Example 3: Use an inverse matrix to solve (if possible) the system of linear equations:

$$\begin{cases} 12x + 8y = 416 \\ 3x + 5y = 152 \end{cases}$$

What you should learn

How to use inverse matrices to solve systems of linear equations

Homework Assignment

Page(s)

Exercises