MA 265 Lecture 11

Section 3.4 Inverse of a Matrix

Review: Cofactor Expansion

$\det(A) =$

Theorem If $A = [a_{ij}]$ is an $n \times n$ matrix, then

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Proof.

Definition of Adjoint Matrix

Let $A = [a_{ij}]$ be an $n \times n$ matrix.

Example 1. *Compute adj A where*

$$A = \begin{bmatrix} 3 & -2 & 1 \\ 5 & 6 & 2 \\ 1 & 0 & -3 \end{bmatrix}$$

Theorem If $A = [a_{ij}]$ is an $n \times n$ matrix, then

Remark: If $A = [a_{ij}]$ is an $n \times n$ matrix and $\det(A) \neq 0$, then

Section 3.5 Other Applications of Determinants

Cramer's Rule: a method for solving a linear system of n equations and n unknowns

Let

$$\begin{aligned} a_{11}x_1 + a_{12}x_2 + \cdots + a_{1n}x_n &= b_1 \\ a_{21}x_1 + a_{22}x_2 + \cdots + a_{2n}x_n &= b_2 \\ \vdots \quad & \quad \vdots \\ a_{n1}x_1 + a_{n2}x_2 + \cdots + a_{nn}x_n &= b_n \end{aligned}$$

be a linear system of n equations and n unknowns.

Example 2. *Use Cramer's rule to solve the following linear system:*

$$\begin{aligned} -2x_1 + 3x_2 - x_3 &= 1 \\ x_1 + 2x_2 - x_3 &= 4 \\ -2x_1 - x_2 + x_3 &= -3 \end{aligned}$$