MA 265 Lecture 10

Section 3.3 Cofactor Expansion

Definition of Minor

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

Definition of Cofactor

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

Example 1. *Find the cofactors A_{12} and A_{23} if*

$$A = \begin{bmatrix} 4 & 3 & 2 \\ 4 & -2 & 5 \\ 2 & 4 & 6 \end{bmatrix}$$

Theorem (cofactor expansion) Let $A = [a_{ij}]$ be an $n \times n$ matrix. Then

$$det(A) =$$

and

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Example 2. *Find the determinant of*

$$A = \begin{bmatrix} 1 & 2 & -3 & 4 \\ -4 & 2 & 1 & 3 \\ 3 & 0 & 0 & -3 \\ 2 & 0 & -2 & 3 \end{bmatrix}$$

Example 3. *Find all values of t for which*

$$det \begin{bmatrix} t-1 & 0 & 1 \\ 2 & t+2 & -1 \\ 0 & 0 & t+1 \end{bmatrix} = 0$$