

Midterm Exam 1: Help Sheet

ECON 441: Introduction to Mathematical Economics

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Minor

The minor of the element a_{ij} , denoted by $|M_{ij}|$, is obtained by deleting the i th row and j th column of the matrix and taking the determinant of the resulting matrix.

Cofactor

The cofactor $|C_{ij}|$ is defined as:

$$|C_{ij}| = (-1)^{i+j} |M_{ij}|$$

Determinant

For an $n \times n$ matrix, expanding with respect to the *first* row:

$$|A| = \sum_{j=1}^n a_{1j} |C_{1j}|$$

Adjoint

The transpose of the cofactor matrix $C = [|C_{ij}|]$:

$$\text{adj} A = C^T = \begin{bmatrix} |C_{11}| & |C_{21}| & \cdots & |C_{n1}| \\ |C_{12}| & |C_{22}| & \cdots & |C_{n2}| \\ \vdots & \vdots & \cdots & \vdots \\ |C_{1n}| & |C_{2n}| & \cdots & |C_{nn}| \end{bmatrix}$$

Inverse

Divide the adjoint of A by the determinant of A :

$$A^{-1} = \frac{1}{|A|} \text{adj} A$$

Cramer's Rule

Given $Ax = b$, form the matrix A_k by interchanging the k th column of A with b ; then

$$x_k^* = \frac{|A_k|}{|A|}$$