

Section 8.4 The Determinant of a Square Matrix

Objective: In this lesson you learned how to find minors, cofactors, and determinants of square matrices.

Course Number

Instructor

Date

Important Vocabulary

Define each term or concept.

Determinant

Minors

Cofactors

I. The Determinant of a 2×2 Matrix (Pages 658–659)

The **determinant** of the 2×2 matrix $A = \begin{bmatrix} a_1 & b_1 \\ a_2 & b_2 \end{bmatrix}$ is given by

$$\det(A) = |A| = \begin{vmatrix} & \\ & \end{vmatrix} = \underline{\hspace{2cm}}$$

What you should learn

How to find the determinants of 2×2 matrices

The determinant of a matrix of order 1×1 is defined as . . .

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

II. Minors and Cofactors (Page 660)

Complete the sign patterns for cofactors of a 3×3 matrix, a 4×4 matrix, and a 5×5 matrix:

Sign Pattern for Cofactors

3×3 matrix

$$\begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}$$

4×4 matrix

$$\begin{bmatrix} & & & \\ & & & \\ & & & \\ & & & \end{bmatrix}$$

5×5 matrix

$$\begin{bmatrix} & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \end{bmatrix}$$

What you should learn

How to find minors and cofactors of square matrices

Example 2: Use the matrix $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 0 \\ 0 & 2 & 3 \end{bmatrix}$ to find:

(a) the minor M_{13} , and (b) the cofactor C_{21} .

III. The Determinant of a Square Matrix (Pages 661–662)

Applying the definition of the determinant of a square matrix to find a determinant is called _____.

What you should learn
How to find the determinants of square matrices

Example 3: Find the determinant of the matrix:

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

Example 4: Describe a strategy for finding the determinant of the following matrix, and then find the determinant of the matrix.

$$B = \begin{bmatrix} -2 & 4 & 0 & 5 \\ 0 & 2 & -1 & 0 \\ 3 & 1 & -4 & -1 \\ -5 & 0 & -2 & 3 \end{bmatrix}$$

Homework Assignment

Page(s)

Exercises