Precalculus

9-05 Determinants of Matrices

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Determinant

- _____number associated with a _____matrix

2×2

- If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then

$$\det(A) = |A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$$
$$= ad - bc$$

- _____product – _____ product

Find $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$

3×3

- Copy 1st _____columns _____matrix
- + products of _____– products of _____

$\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$

Expansion by cofactors

- Sign Pattern

$$\begin{bmatrix} + & - & + & - & \cdots \\ - & + & - & + & \cdots \\ + & - & + & - & \cdots \\ - & + & - & + & \cdots \\ \vdots & \vdots & \vdots & \vdots & \ddots \end{bmatrix}$$

- Minor
  - Determinant of matrix created by crossing out a _____and _____
- Cofactor
  - Minor with _____from sign pattern

Given $\begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 0 \\ 0 & 2 & 3 \end{bmatrix}$, find

Minor M_{13} Cofactor C_{13}

Find $\begin{vmatrix} -1 & 0 & 4 \\ 3 & -2 & 0 \\ 1 & -1 & 1 \end{vmatrix}$

Find $\begin{vmatrix} -2 & 4 & 0 & 5 \\ 0 & 2 & -1 & 0 \\ 3 & 1 & -4 & -1 \\ -5 & 0 & -2 & 3 \end{vmatrix}$