Matrices & Linear Algebra I
C Term, Sections C01-C04
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Algorithm for Computing a Determinant

Problem: For $A = \begin{bmatrix} 0 & 0 & 12 \\ 2 & -6 & 0 \\ 8 & 0 & 10 \end{bmatrix}$, find $\det A$ by the row reduction technique.

Solution: We don't know $\det A$. So we give it a name. Call it Δ. Now we row reduce to upper triangular form:

Matrix	Operation	Determinant
$\begin{bmatrix} 0 & 0 & 12 \\ 2 & -6 & 0 \\ 8 & 0 & 10 \end{bmatrix}$		$\det = \Delta$
$\begin{bmatrix} 2 & -6 & 0 \\ 0 & 0 & 12 \\ 8 & 0 & 10 \end{bmatrix}$	row swap	$\det = -\Delta$
$\begin{bmatrix} 2 & -6 & 0 \\ 0 & 0 & 12 \\ 0 & 24 & 10 \end{bmatrix}$	add -4 times 1st to 3rd	$\det = -\Delta$
$\begin{bmatrix} 2 & -6 & 0 \\ 0 & 24 & 10 \\ 0 & 0 & 12 \end{bmatrix}$	row swap	$\det = \Delta$

Now this last matrix is upper triangular; it has determinant $2 \cdot 24 \cdot 12 = 576$.
So

$$\det A = \Delta = 576.$$