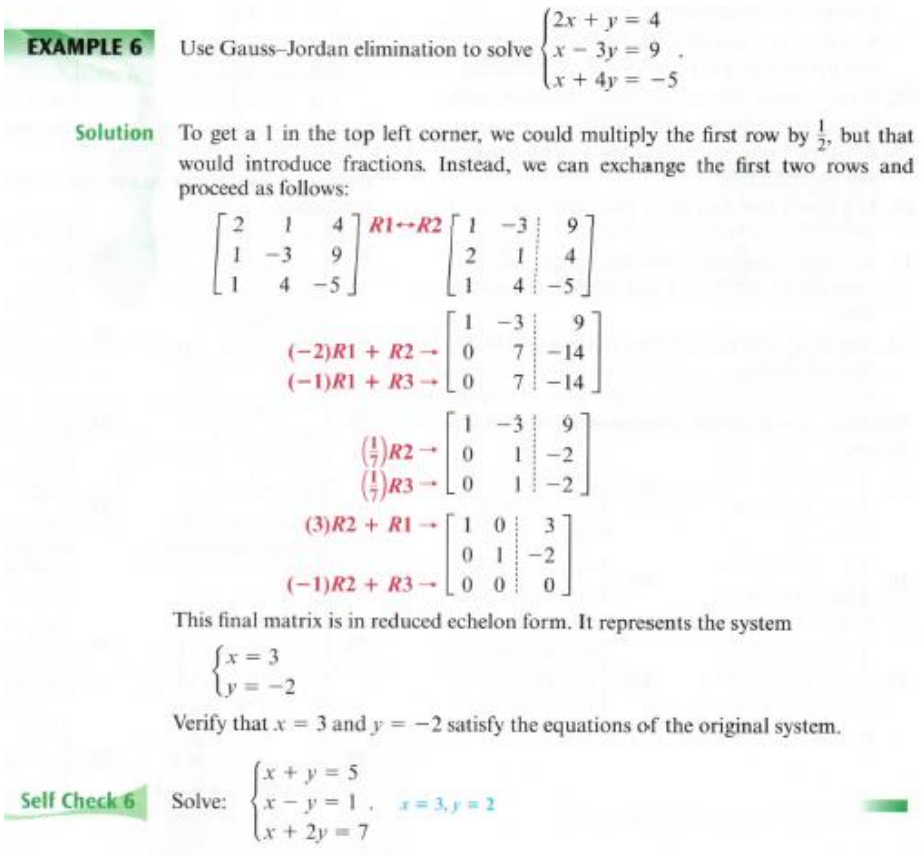
gaussian elimination with partial pivoting pdf download



EXAMPLE 6 Use Gauss–Jordan elimination to solve $\begin{cases} 2x + y = 4 \\ x - 3y = 9 \\ x + 4y = -5 \end{cases}$.

Solution To get a 1 in the top left corner, we could multiply the first row by $\frac{1}{2}$, but that would introduce fractions. Instead, we can exchange the first two rows and proceed as follows:

$$\begin{bmatrix} 2 & 1 & 4 \\ 1 & -3 & 9 \\ 1 & 4 & -5 \end{bmatrix} \xrightarrow{R1 \leftrightarrow R2} \left[\begin{array}{rrr} 1 & -3 & 9 \\ 2 & 1 & 4 \\ 1 & 4 & -5 \end{array}\right]$$

$$\begin{matrix} \\ (-2)R1 + R2 \rightarrow \\ (-1)R1 + R3 \rightarrow \end{matrix} \left[\begin{array}{rrr} 1 & -3 & 9 \\ 0 & 7 & -14 \\ 0 & 7 & -14 \end{array}\right]$$

$$\begin{matrix} \\ \left(\frac{1}{7}\right)R2 \rightarrow \\ \left(\frac{1}{7}\right)R3 \rightarrow \end{matrix} \left[\begin{array}{rrr} 1 & -3 & 9 \\ 0 & 1 & -2 \\ 0 & 1 & -2 \end{array}\right]$$

$$\begin{matrix} \\ (3)R2 + R1 \rightarrow \\ (-1)R2 + R3 \rightarrow \end{matrix} \left[\begin{array}{rrr} 1 & 0 & 3 \\ 0 & 1 & -2 \\ 0 & 0 & 0 \end{array}\right]$$

This final matrix is in reduced echelon form. It represents the system

$$\begin{cases} x = 3 \\ y = -2 \end{cases}$$

Verify that $x = 3$ and $y = -2$ satisfy the equations of the original system.

Self Check 6 Solve: $\begin{cases} x + y = 5 \\ x - y = 1 \\ x + 2y = 7 \end{cases}$. $x = 3, y = 2$

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