

EXAMPLE 2 Solve a matrix equationSolve the matrix equation $AX = B$ for the 2×2 matrix X .

$$\overbrace{\begin{bmatrix} 2 & -7 \\ -1 & 4 \end{bmatrix}}^A X = \overbrace{\begin{bmatrix} -21 & 3 \\ 12 & -2 \end{bmatrix}}^B$$

SolutionBegin by finding the inverse of A .

$$A^{-1} = \frac{1}{8-7} \begin{bmatrix} 4 & 7 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 4 & 7 \\ 1 & 2 \end{bmatrix}$$

To solve the equation for X , multiply both sides of the equation by A^{-1} on the left.

$$\begin{bmatrix} 4 & 7 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} 2 & -7 \\ -1 & 4 \end{bmatrix} X = \begin{bmatrix} 4 & 7 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} -21 & 3 \\ 12 & -2 \end{bmatrix} \quad A^{-1}AX = A^{-1}B$$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} X = \begin{bmatrix} 0 & -2 \\ 3 & -1 \end{bmatrix} \quad IX = A^{-1}B$$

$$X = \begin{bmatrix} 0 & -2 \\ 3 & -1 \end{bmatrix} \quad X = A^{-1}B$$

**GUIDED PRACTICE** for Example 2

4. Solve the matrix equation $\begin{bmatrix} -4 & 1 \\ 0 & 6 \end{bmatrix} X = \begin{bmatrix} 8 & 9 \\ 24 & 6 \end{bmatrix}$.

INVERSE OF A 3×3 MATRIX The inverse of a 3×3 matrix is difficult to compute by hand. A calculator that will compute inverse matrices is useful in this case.**EXAMPLE 3** Find the inverse of a 3×3 matrixUse a graphing calculator to find the inverse of A . Then use the calculator to verify your result.

$$A = \begin{bmatrix} 2 & 1 & -2 \\ 5 & 3 & 0 \\ 4 & 3 & 8 \end{bmatrix}$$

SolutionEnter matrix A into a graphing calculator and calculate A^{-1} . Then compute AA^{-1} and $A^{-1}A$ to verify that you obtain the 3×3 identity matrix.