# 7.4.1: Inverse Matrices (Exercises)

## SECTION 7.4 PROBLEM SET: INVERSE MATRICES

In problems 1- 2, verify that the given matrices are inverses of each other.

1. $\begin{bmatrix} 7 & 3 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & -3 \\ -2 & 7 \end{bmatrix}$

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

In problems 3- 6, find the inverse of each matrix by the row-reduction method.

3. $\begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$

4. $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 4 \\ 0 & 0 & 1 \end{bmatrix}$

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In problems 5 - 6, find the inverse of each matrix by the row-reduction method.

5. $\begin{bmatrix} 1 & 1 & -1 \\ 1 & 0 & 1 \\ 2 & 1 & 1 \end{bmatrix}$

6. $\begin{bmatrix} 1 & 1 & 1 \\ 3 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$

Problems 7 -10: Express the system as $AX = B$; then solve using matrix inverses found in problems 3 - 6.

7. $\begin{aligned} 3x - 5y &= 2 \\ -x + 2y &= 0 \end{aligned}$

8. $\begin{aligned} x + \quad 2z &= 8 \\ y + 4z &= 8 \\ z &= 3 \end{aligned}$

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Problems 9 -10: Express the system as $AX = B$; then solve using matrix inverses found in problems 3 - 6.

9. $\begin{aligned} x + y - z &= 2 \\ x + z &= 7 \\ 2x + y + z &= 13 \end{aligned}$

10. $\begin{aligned} x + y + z &= 2 \\ 3x + y &= 7 \\ x + y + 2z &= 3 \end{aligned}$

11. Why is it necessary that a matrix be a square matrix for its inverse to exist? Explain by relating the matrix to a system of equations.

12. Suppose we are solving a system $AX = B$ by the matrix inverse method, but discover $A$ has no inverse. How else can we solve this system? What can be said about the solutions of this system?

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