

## Matrix Equations - Inverses Required

Solve each equation.

1) 
$$\begin{bmatrix} 4 & -2 \\ -7 & 2 \end{bmatrix} X = \begin{bmatrix} -6 \\ 12 \end{bmatrix}$$

2) 
$$\begin{bmatrix} -1 & 1 \\ 5 & -2 \end{bmatrix} C = \begin{bmatrix} 4 \\ -26 \end{bmatrix}$$

3) 
$$\begin{bmatrix} 2 & -3 \\ -5 & 5 \end{bmatrix} Z = \begin{bmatrix} -1 \\ 20 \end{bmatrix}$$

4) 
$$\begin{bmatrix} 1 & -9 \\ 1 & 0 \end{bmatrix} Z = \begin{bmatrix} -35 \\ -8 \end{bmatrix}$$

5) 
$$\begin{bmatrix} -1 & 2 \\ -6 & 10 \end{bmatrix} Z = \begin{bmatrix} 6 \\ 22 \end{bmatrix}$$

6) 
$$3X = \begin{bmatrix} 12 & -12 \\ 21 & -27 \end{bmatrix}$$

7) 
$$\begin{bmatrix} 25 & 13 \\ 13 & 9 \end{bmatrix} = \begin{bmatrix} 7 & -2 \\ 3 & -2 \end{bmatrix} X$$

8) 
$$\begin{bmatrix} 20 & -3 \\ 15 & -3 \end{bmatrix} = \begin{bmatrix} -6 & -5 \\ -5 & -4 \end{bmatrix} X$$

Solve each equation or state if there is no unique solution.

$$9) Y - \begin{bmatrix} -1 \\ -5 \\ 8 \\ 8 \end{bmatrix} = \begin{bmatrix} -6 \\ 6 \\ -16 \\ 0 \end{bmatrix}$$

$$10) \begin{bmatrix} -1 & -1 \\ -8 & 0 \end{bmatrix} X = \begin{bmatrix} -6 & 3 \\ -40 & -40 \end{bmatrix}$$

$$11) \begin{bmatrix} 0 & -4 \\ 0 & -1 \end{bmatrix} X = \begin{bmatrix} 28 & 0 & -20 \\ 7 & 0 & -5 \end{bmatrix}$$

$$12) \begin{bmatrix} 9 & -15 \\ -21 & 39 \end{bmatrix} = \begin{bmatrix} 2 & -3 \\ -7 & 9 \end{bmatrix} X$$

$$13) \begin{bmatrix} -1 & -2 \\ 2 & 9 \end{bmatrix} B = \begin{bmatrix} -3 & -5 & 13 \\ 21 & 0 & -36 \end{bmatrix}$$

$$14) \begin{bmatrix} -1 & -9 \\ 0 & -1 \end{bmatrix} C = \begin{bmatrix} 11 \\ 2 \end{bmatrix}$$

**Critical thinking questions:**

15) Assuming that a solution exists, what are the dimensions of  $M$ ?

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix} M = \begin{bmatrix} -2 & 3 \\ 5 & -10 \\ 0 & 1 \end{bmatrix}$$

16) Find one solution to:

$$\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} X = \begin{bmatrix} 3 & 5 \\ 0 & 0 \end{bmatrix}$$

## Matrix Equations - Inverses Required

Solve each equation.

$$1) \begin{bmatrix} 4 & -2 \\ -7 & 2 \end{bmatrix} X = \begin{bmatrix} -6 \\ 12 \end{bmatrix}$$
$$\begin{bmatrix} -2 \\ -1 \end{bmatrix}$$

$$2) \begin{bmatrix} -1 & 1 \\ 5 & -2 \end{bmatrix} C = \begin{bmatrix} 4 \\ -26 \end{bmatrix}$$
$$\begin{bmatrix} -6 \\ -2 \end{bmatrix}$$

$$3) \begin{bmatrix} 2 & -3 \\ -5 & 5 \end{bmatrix} Z = \begin{bmatrix} -1 \\ 20 \end{bmatrix}$$
$$\begin{bmatrix} -11 \\ -7 \end{bmatrix}$$

$$4) \begin{bmatrix} 1 & -9 \\ 1 & 0 \end{bmatrix} Z = \begin{bmatrix} -35 \\ -8 \end{bmatrix}$$
$$\begin{bmatrix} -8 \\ 3 \end{bmatrix}$$

$$5) \begin{bmatrix} -1 & 2 \\ -6 & 10 \end{bmatrix} Z = \begin{bmatrix} 6 \\ 22 \end{bmatrix}$$
$$\begin{bmatrix} 8 \\ 7 \end{bmatrix}$$

$$6) 3X = \begin{bmatrix} 12 & -12 \\ 21 & -27 \end{bmatrix}$$
$$\begin{bmatrix} 4 & -4 \\ 7 & -9 \end{bmatrix}$$

$$7) \begin{bmatrix} 25 & 13 \\ 13 & 9 \end{bmatrix} = \begin{bmatrix} 7 & -2 \\ 3 & -2 \end{bmatrix} X$$
$$\begin{bmatrix} 3 & 1 \\ -2 & -3 \end{bmatrix}$$

$$8) \begin{bmatrix} 20 & -3 \\ 15 & -3 \end{bmatrix} = \begin{bmatrix} -6 & -5 \\ -5 & -4 \end{bmatrix} X$$
$$\begin{bmatrix} 5 & 3 \\ -10 & -3 \end{bmatrix}$$

Solve each equation or state if there is no unique solution.

$$9) Y - \begin{bmatrix} -1 \\ -5 \\ 8 \\ 8 \end{bmatrix} = \begin{bmatrix} -6 \\ 6 \\ -16 \\ 0 \end{bmatrix}$$
$$\begin{bmatrix} -7 \\ 1 \\ -8 \\ 8 \end{bmatrix}$$

$$10) \begin{bmatrix} -1 & -1 \\ -8 & 0 \end{bmatrix} X = \begin{bmatrix} -6 & 3 \\ -40 & -40 \end{bmatrix}$$
$$\begin{bmatrix} 5 & 5 \\ 1 & -8 \end{bmatrix}$$

$$11) \begin{bmatrix} 0 & -4 \\ 0 & -1 \end{bmatrix} X = \begin{bmatrix} 28 & 0 & -20 \\ 7 & 0 & -5 \end{bmatrix}$$

No unique solution

$$12) \begin{bmatrix} 9 & -15 \\ -21 & 39 \end{bmatrix} = \begin{bmatrix} 2 & -3 \\ -7 & 9 \end{bmatrix} X$$
$$\begin{bmatrix} -6 & 6 \\ -7 & 9 \end{bmatrix}$$

$$13) \begin{bmatrix} -1 & -2 \\ 2 & 9 \end{bmatrix} B = \begin{bmatrix} -3 & -5 & 13 \\ 21 & 0 & -36 \end{bmatrix}$$
$$\begin{bmatrix} -3 & 9 & -9 \\ 3 & -2 & -2 \end{bmatrix}$$

$$14) \begin{bmatrix} -1 & -9 \\ 0 & -1 \end{bmatrix} C = \begin{bmatrix} 11 \\ 2 \end{bmatrix}$$
$$\begin{bmatrix} 7 \\ -2 \end{bmatrix}$$

**Critical thinking questions:**

15) Assuming that a solution exists, what are the dimensions of  $M$ ?

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix} M = \begin{bmatrix} -2 & 3 \\ 5 & -10 \\ 0 & 1 \end{bmatrix}$$

$2 \times 2$

16) Find one solution to:

$$\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} X = \begin{bmatrix} 3 & 5 \\ 0 & 0 \end{bmatrix}$$

Many answers. Ex:  $\begin{bmatrix} 2 & 2 \\ 3 & 5 \end{bmatrix}$