Slide 1

Solve this matrix equation for matrix X.

$$\begin{bmatrix} 12 & 8 \\ 4 & 3 \end{bmatrix} - X = \begin{bmatrix} -4 & 36 \\ -2 & 12 \end{bmatrix}$$

$+X \qquad +X$

To solve this for X you could add X to both sides to get: A = B+X

Then you could subtract B from both sides to get A - B = X

$$\begin{bmatrix} 12 & 8 \\ 4 & 3 \end{bmatrix} - \begin{bmatrix} -4 & 36 \\ -2 & 12 \end{bmatrix} = X$$

$$\begin{bmatrix} 16 & -28 \\ 6 & -9 \end{bmatrix} = X$$

Slide 2

Solve this matrix equation for matrix X.

$$\begin{bmatrix} 5 & 3 \\ 4 & 2 \end{bmatrix} X = \begin{bmatrix} 7 \\ 6 \end{bmatrix}$$

$A \cdot X = B$

Does $\qquad X = A^{-1} \cdot B \qquad$ or $\qquad X = B \cdot A^{-1}$?

$2 \times 2 \cdot 2 \times 1 \qquad\qquad 2 \times 1 \cdot 2 \times 2$

$$X = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$$

You can't multiply these two matrices because the middle numbers don't match.

Slide 3

Solve this matrix equation for matrix X.

$$\begin{bmatrix} 12 & 8 \\ 4 & 3 \end{bmatrix} X = \begin{bmatrix} -4 & 36 \\ -2 & 12 \end{bmatrix}$$

$A \cdot X = B$

Does $\qquad X = A^{-1} \cdot B \qquad$ or $\qquad X = B \cdot A^{-1}$?

$2 \times 2 \quad 2 \times 2 \qquad\qquad 2 \times 2 \cdot 2 \times 2$

$$X = \begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix} \qquad \begin{bmatrix} -39 & 116 \\ -13.5 & 40 \end{bmatrix}$$

When this matrix is placed back into the original equation it does make the equation true. Therefore, it is a solution.

When this matrix is placed back into the original equation it makes the equation true. Therefore, it is not a solution.

Slide 4

Regardless of dimensions, to solve the following matrix equation: $A \cdot X = B$

You will always find matrix X by doing the following:

$$X = A^{-1} \cdot B$$

Solve this matrix equation for matrix X.

$$\begin{bmatrix} 9 & 25 \\ 4 & 11 \end{bmatrix} X = \begin{bmatrix} 3 \\ -7 \end{bmatrix}$$

Enter as Matrix A on calculator   Enter as Matrix B on calculator

Solve this equation by:

$$X = A^{-1} \cdot B$$

$$X = \begin{bmatrix} -208 \\ 75 \end{bmatrix}$$

Solve this matrix equation for matrix X.

$$\begin{bmatrix} 5 & 7 \\ 3 & -2 \end{bmatrix} X = \begin{bmatrix} 83 \\ -6 \end{bmatrix}$$

Enter as Matrix A on calculator   Enter as Matrix B on calculator

Solve this equation by:

$$X = A^{-1} \cdot B$$

$$X = \begin{bmatrix} 1 \\ 9 \end{bmatrix}$$

Solve this matrix equation for matrix X.

$$\begin{bmatrix} 4 & 1 & 0 \\ 3 & -2 & 1 \\ 1 & 3 & -5 \end{bmatrix} X = \begin{bmatrix} 7 \\ 11 \\ -16 \end{bmatrix}$$

Enter as Matrix A on calculator   Enter as Matrix B on calculator

Solve this equation by:

$$X = A^{-1} \cdot B$$

$$X = \begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}$$

Solve this matrix equation for matrix X.

$$3\begin{bmatrix} 7 & 0 \\ -1 & 6 \end{bmatrix} - \begin{bmatrix} 8 & 2 \\ -3 & -9 \end{bmatrix} X = \begin{bmatrix} 13 & 26 \\ 33 & 99 \end{bmatrix}$$

$$-\begin{bmatrix} 8 & 2 \\ -3 & -9 \end{bmatrix} X = \begin{bmatrix} 13 & 26 \\ 33 & 99 \end{bmatrix} - 3\begin{bmatrix} 7 & 0 \\ -1 & 6 \end{bmatrix}$$

$$\begin{bmatrix} -8 & -2 \\ 3 & 9 \end{bmatrix} X = \begin{bmatrix} -8 & 26 \\ 36 & 81 \end{bmatrix}$$

↑ Enter as Matrix A on calculator   ↑ Enter as Matrix B on calculator

Simplify down to A·X = B

Solve this equation by:

$$X = A^{-1} \cdot B$$

$$X = \begin{bmatrix} 0 & -6 \\ 4 & 11 \end{bmatrix}$$

What if you don't have a graphing calculator to use?

Do it by hand!

or

Go to my blog!

You can now finish Hwk # 23

Practice Sheet: Solving Matrix Equations.

Solve this system of equations.

$(7x + 4y = 6)\,3$

$(4x - 6y = 20)\,2$ +

$21x + 12y = 18$

$8x - 12y = 40$

$\dfrac{29x}{29} = \dfrac{58}{29}$

$x = 2$

$(2, -2)$

$7(2) + 4y = 6$

$-14 \qquad -14$

$4y = -8$