Solve this matrix equation for matrix X.

$$2\begin{bmatrix} 2 & -3 \\ 7 & -4 \end{bmatrix} + 3X = \begin{bmatrix} 7 & -33 \\ 14 & 7 \end{bmatrix}$$

A B

Writing this using variables for the matrices you get:

$2A + 3X = B$

subtract 2A from both sides to get

$3X = B - 2A$

since division doesn't work with matrices you can get X by itself by multiplying both sides by 3^{-1} to get:

$X = 3^{-1}(B - 2A)$ ⟶ $\begin{bmatrix} 1 & -9 \\ 0 & 5 \end{bmatrix}$

Solve this matrix equation for matrix X.

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

Picture this equation as:

$A \cdot X = B$

To solve for X, multiply both sides by A^{-1}

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

2x2 · 2x1 = $\begin{bmatrix} 2 \\ -1 \end{bmatrix}$

This is the solution.

2x1 2x2

since the middle #'s don't match you can't mulitply the matrices this way so it won't lead to the solution

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 B

$A \cdot X = B$

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

2x2 2x2 2x2 2x2

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

By replacing X with these two matrices we find that the correct answer is the first one that we got by doing $A^{-1} \cdot B$.

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.

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

Matrix A

Matrix B

Solve this by doing:

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

$AX = B$ →

$$X = \begin{bmatrix} 4 \\ 9 \end{bmatrix}$$

Solve this matrix equation for matrix X.

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

$AX = B$

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

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.

This is due Tuesday

Solve this system of equations.

This would probably be easiest using Elimination.

$3(8x - 5y = -23) \rightarrow \quad 24x - 15y = -69$

$4(6x + 7y = 15) \rightarrow \quad -(24x + 28y = 60)$

$-43y = -129$

$\frac{-43y}{-43} = \frac{-129}{-43} \rightarrow y = 3$

Using one of the original equations substitute 3 for y and solve for x:

$6x + 7y = 15 \rightarrow$

$6x + 7(3) = 15$

$6x + 21 = 15$

$6x = -6$

$x = -1$

Sol is: (-1, 3)

Turning a system of equations into a matrix equation: $A \cdot X = B$

$8x - 5y = -23$

$6x + 7y = 15$

A • X = B

Matrix A is called the Coefficient Matrix:

2×2

$\begin{bmatrix} 8 & -5 \\ 6 & 7 \end{bmatrix}$

•

Matrix X is called the Variable Matrix:

2×1

$\begin{bmatrix} x \\ y \end{bmatrix}$

=

Matrix B is called the Constant (or Answer) Matrix:

2×1

$\begin{bmatrix} -23 \\ 15 \end{bmatrix}$

Solve this by doing:

$X = A^{-1} \cdot B = \begin{bmatrix} -1 \\ 3 \end{bmatrix}$

as an ordered pair the answer is: (-1, 3)

When using matrices to solve a system of equations both equations must be in Standard Form.

When you solve you will always do this:

$$\begin{bmatrix} X \\ Y \end{bmatrix} = A^{-1} \cdot B$$

Use matrices to solve this system of equations:

$11a - 15b = -145$

$13b + 8a = 38 \rightarrow$ rewrite this so that the variables on the left side are in the same order as the top equation

$11a - 15b = -145$

$8a + 13b = 38$

Write this system as a matrix equation:

$\begin{bmatrix} 11 & -15 \\ 8 & 13 \end{bmatrix} X = \begin{bmatrix} -145 \\ 38 \end{bmatrix}$

$A \quad X = B$

$X = A^{-1} B = \begin{bmatrix} -5 \\ 6 \end{bmatrix}$

as an ordered pair the answer is: (-5, 6)