## Solve this matrix equation for matrix X.

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

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:

$$X = 3^{-1}(B - 2A)$$

## 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

$$X = A^{-1} \cdot B$$
 or  $X = B \cdot A^{-1}$ ?  
 $2 \times 2 \quad 2 \times 2 \quad 2 \times 2$   
 $\begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix}$   $\begin{bmatrix} -39 & || 16 \\ -13.5 & || 40 \end{bmatrix}$ 

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

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<sup>-1</sup>

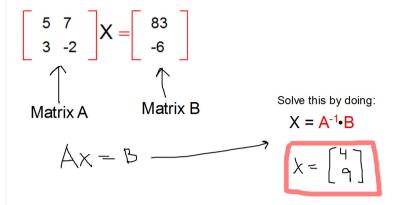
solution.

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.



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

Do it by hand!

or

Go to my blog!

Solve this matrix equation for matrix X.

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

$$A X = B$$

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

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.

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

$$-43y = -729$$

$$-73y = -73y = -729$$

$$-73y = -73y = -73y$$

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

When you solve you will always do this:

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

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

$$8x - 5y = -23$$

$$6x + 7y = 15$$

В

Matrix A is called the Coefficient Matrix:

• Matrix X is called the Variable Matrix:

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

Solve this by doing: 
$$X = A^{-1} \cdot B = \begin{bmatrix} -1 \\ 3 \end{bmatrix}$$

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

Use matrices to solve this system of equations:

$$11a - 15b = -145$$

$$11a - 15b = -145$$

 $^{\circ}$ 8a + 13b = 38 Write this system as a matrix equation:  $\begin{bmatrix} 11 & -15 \\ 8 & 13 \end{bmatrix} \chi = \begin{bmatrix} -145 \\ 38 \end{bmatrix}$ A X = B

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

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