Find this product without a graphing calculator.

$$\begin{bmatrix} 3 & 2 & -6 \\ 1 & -4 & 7 \end{bmatrix}\begin{bmatrix} -5 & 0 \\ 9 & -2 \\ 10 & -8 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} -57 & 44 \\ 29 & -48 \end{bmatrix}$$

2x3 3x2 2x2

a = Row 1 x Col 1 → $a = -15 + 18 - 60$

b = Row 1 x Col 2 → $b = 0 - 4 + 48$

c = Row 2 x Col 1 → $c = -5 - 36 + 70$

d = Row 2 x Col 2 → $d = 0 + 8 - 56$

Find the value of each variable

$$\begin{bmatrix} 3 & 2 & -6 \\ 1 & -4 & w-3 \end{bmatrix} - \begin{bmatrix} -10 & x+6 & -4 \\ -8 & 6-z & -1 \end{bmatrix} = \begin{bmatrix} 2y+5 & -3 & 7 \\ -9 & 13 & -6 \end{bmatrix}$$

$w - 3 + 1 = -6$

$w - 2 = -6$

$+2 \quad +2$

$w = -4$

$2 - (x+6) = -3$

$2 - x - 6 = -3$

$-4 - x = -3$

$+4 \quad +4$

$-x = 1 \rightarrow x = -1$

$-4 - (6 - z) = 13$

$-4 - 6 + z = 13$

$-10 + z = 13$

$z = 23$

$3 - -10 = 2y + 5$

$13 = 2y + 5$

$8 = 2y$

$y = 4$

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.

this is one method

$$3\begin{bmatrix} -5 & 1 \\ 10 & 3 \end{bmatrix} - 4\begin{bmatrix} -2 & 6 \\ -8 & -1 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$3A - 4BX = C$

$-4BX = C - 3A$

$X = (-4B)^{-1}(C - 3A)$

$$\begin{bmatrix} 0 & -2 \\ 7 & 4 \end{bmatrix}$$

here is another method

DISTRIBUTE SCALARS

$$3\begin{bmatrix} -5 & 1 \\ 10 & 3 \end{bmatrix} - 4\begin{bmatrix} -2 & 6 \\ -8 & -1 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$$\begin{bmatrix} -15 & 3 \\ 30 & 9 \end{bmatrix} + \begin{bmatrix} 8 & -24 \\ 32 & 4 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$$A + BX = C$$

$$BX = C - A$$

$$B^{-1}(C - A) = \begin{bmatrix} 0 & -2 \\ 7 & 4 \end{bmatrix}$$

DISTRIBUTE SCALARS

simplify down to just $AX = B$

$$3\begin{bmatrix} -5 & 1 \\ 10 & 3 \end{bmatrix} - 4\begin{bmatrix} -2 & 6 \\ -8 & -1 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$$\begin{bmatrix} -15 & 3 \\ 30 & 9 \end{bmatrix} + \begin{bmatrix} 8 & -24 \\ 32 & 4 \end{bmatrix} X = \begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix}$$

$$\begin{bmatrix} 8 & -24 \\ 32 & 4 \end{bmatrix} X = \begin{bmatrix} -168 & -112 \\ 28 & -48 \end{bmatrix}$$

$$\begin{bmatrix} -183 & -109 \\ 58 & -39 \end{bmatrix} - \begin{bmatrix} -15 & 3 \\ 30 & 9 \end{bmatrix}$$

$$A \quad X = B$$

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

$$= \begin{bmatrix} 0 & -2 \\ 7 & 4 \end{bmatrix}$$

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

When you solve you will always do this:

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

Solve each system of equations. State solutions as orderd pairs or triples. If using matrices write down the two matrices you used.

$$4x + 9y = 11$$
$$-7x + 11y = 61$$

$(-4, 3)$

$$\begin{bmatrix} 4 & 9 \\ -7 & 11 \end{bmatrix} X = \begin{bmatrix} 11 \\ 61 \end{bmatrix}$$

A $\quad$ B

$$X = A^{-1}B = \begin{bmatrix} -4 \\ 3 \end{bmatrix}$$

$y = 4.75x + 16.3$

$6.1x - 1.08y = -20.126$

$(-2.6, 3.95)$

$\begin{bmatrix} -4.75 & 1 \\ 6.1 & -1.08 \end{bmatrix} X = \begin{bmatrix} 16.3 \\ -20.126 \end{bmatrix}$

A B

$X = A^{-1}B = \begin{bmatrix} -2.6 \\ 3.95 \end{bmatrix}$

$4a + 9b - c = -65$

$-6b + 7c = 83$

$8c - 5a + b = 17$

$(3, -8, 5)$

$\begin{bmatrix} 4 & 9 & -1 \\ 0 & -6 & 7 \\ -5 & 1 & 8 \end{bmatrix} X = \begin{bmatrix} -65 \\ 83 \\ 17 \end{bmatrix}$

A B

$X = A^{-1}B = \begin{bmatrix} 3 \\ -8 \\ 5 \end{bmatrix}$

The cost of a pen is \$0.03 less than eight times the cost of a pencil. I bought a dozen pens and fifteen pencils for \$7.41. Write and solve a system of equations to find the cost of each pen and each pencil.

X = Cost for a pen

y = Cost for a pencil

$X = 8y - .03$

$X - 8y = -.03$

$12X + 15y = 7.41$

\$.53 for a pen

\$.07 for a pencil

$\begin{bmatrix} 1 & -8 \\ 12 & 15 \end{bmatrix} X = \begin{bmatrix} -.03 \\ 7.41 \end{bmatrix}$

$AX = B$

$X = A^{-1}B = \begin{bmatrix} 0.53 \\ 0.07 \end{bmatrix}$

The cost of apples is \$1.99 per pound and the cost of pears is \$2.48 per pound. When I bought some apples and pears I spent \$22.61. It turns out that I bought twice as many pounds of apples as pears . Write and solve a system of equations to find out how many pounds of each I bought.

a = #lbs apples

p = # " pears

$1.99a + 2.48p = 22.61$

$a = 2p$

$a - 2p = 0$

$\begin{bmatrix} 1.99 & 2.48 \\ 1 & -2 \end{bmatrix} X = \begin{bmatrix} 22.61 \\ 0 \end{bmatrix}$

$AX = B$

$X = A^{-1}B = \begin{bmatrix} 7 \\ 3.5 \end{bmatrix}$

7 pounds of apples

3.5 pounds of pears