Solve this matrix equation.

$$3\underbrace{\begin{bmatrix} 6 & -3 \\ 4 & -1 \end{bmatrix}}_{a} - 5\underbrace{\begin{bmatrix} -8 & 10 \\ -7 & 2 \end{bmatrix}}_{b} X = \underbrace{\begin{bmatrix} -42 & 351 \\ 27 & 312 \end{bmatrix}}_{c}$$

$3a - 5bX = C$

$-3a \qquad -3a$

$-5bX = C - 3a$

$X = (-5b)^{-1}(C - 3a) = \begin{bmatrix} 1 & 9 \\ 2 & 0 \end{bmatrix}$

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.

$p = 8e - 0.03$

$p - 8e = -0.03$

$12p + 15e = 7.41$

p = pens

e = pencils

using matrices

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

$X = A^{-1}B = \begin{bmatrix} .53 \\ .07 \end{bmatrix}$

p = \$0.53

e = \$0.07

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 = # of lbs of apples

P = " " " " pears

A = 7 lbs

P = 3.5 lbs

$1.99A + 2.48P = 22.61$

$A = 2P$

$A - 2P = 0$

using matrices

$X = A^{-1}B = \begin{bmatrix} 7 \\ 3.5 \end{bmatrix} \leftarrow \begin{bmatrix} 1.99 & 2.48 \\ 1 & -2 \end{bmatrix} X = \begin{bmatrix} 22.61 \\ 0 \end{bmatrix}$

Solve.

$$24\left(\frac{w}{8} - \frac{w}{12} + \frac{w}{3}\right) = 5.24$$

$3w - 2w + 8w = 120$

$\frac{9w}{9} = \frac{120}{9}$

$w = 120/9 = 40/3$