

Solutions for Quiz #5

$$\begin{pmatrix} -1 & 2 \\ 4 & -3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} (-1)x + (2)y \\ (4)x + (-3)y \end{pmatrix} = \begin{pmatrix} -x + 2y \\ 4x - 3y \end{pmatrix}$$

Written as a row vector, $\begin{pmatrix} -x + 2y \\ 4x - 3y \end{pmatrix}$ is $(-x + 2y, 4x - 3y)$

To solve for x in $\frac{x^2}{4} + 2x = 3$, subtract 3 to get $\frac{x^2}{4} + 2x - 3 = 0$. That's a quadratic equation with $a = \frac{1}{4}$, $b = 2$, and $c = -3$. The discriminant is $b^2 - 4ac = 2^2 - 4(\frac{1}{4})(-3) = 4 + 3 = 7$. Because $7 > 0$, there are two solutions for x . One of them is

$$\begin{aligned} \frac{-b + \sqrt{b^2 - 4ac}}{2a} &= \frac{-2 + \sqrt{7}}{2/4} = \frac{-2 + \sqrt{7}}{1/2} = 2(-2 + \sqrt{7}) \\ &= -4 + 2\sqrt{7} \end{aligned}$$

The other solution for x is

$$\begin{aligned} \frac{-b - \sqrt{b^2 - 4ac}}{2a} &= \frac{-2 - \sqrt{7}}{2/4} = \frac{-2 - \sqrt{7}}{1/2} = 2(-2 - \sqrt{7}) \\ &= -4 - 2\sqrt{7} \end{aligned}$$