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, \((-x + 2y, 4x - 3y)\) 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

\[
\frac{-b + \sqrt{b^2 - 4ac}}{2a} = \frac{-2 + \sqrt{7}}{2(\frac{1}{4})} = \frac{-2 + \sqrt{7}}{\frac{1}{2}} = 2(-2 + \sqrt{7})
\]

\[= -4 + 2\sqrt{7}\]

The other solution for \(x\) is

\[
\frac{-b - \sqrt{b^2 - 4ac}}{2a} = \frac{-2 - \sqrt{7}}{2(\frac{1}{4})} = \frac{-2 - \sqrt{7}}{\frac{1}{2}} = 2(-2 - \sqrt{7})
\]

\[= -4 - 2\sqrt{7}\]