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MATH 111-I
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Quiz 4

Problem 1: Find a solution to the system of linear equations given below and then verify that the solution is correct.

$$\begin{cases} 2x - y = 4 \\ 4x + y = 8 \end{cases}$$

Using elimination, observe that by adding the equations, we have... But then $6x = 12$*, which implies*

$$\begin{array}{rrrrrr} & 2x & - & y & = & 4 \\ + & 4x & + & y & = & 8 \\ \hline & 6x & + & 0 & = & 12 \end{array}$$

that $x = 2$*. Using this in the second equation, we have...*

$$\begin{gathered} 4x + y = 8 \\ 4(2) + y = 8 \\ 8 + y = 8 \\ y = 0 \end{gathered}$$

Therefore, the solution is $(x, y) = (2, 0)$*, i.e.* $x = 2$ *and* $y = 0$*.*

Alternatively, using substitution, we can solve for y *in the first equation:*

$$\begin{gathered} 2x - y = 4 \\ 2x = y + 4 \\ 2x - 4 = y \\ y = 2x - 4 \end{gathered}$$

Using this in the second equation, we have...

$$\begin{gathered} 4x + y = 8 \\ 4x + (2x - 4) = 8 \\ 6x - 4 = 8 \\ 6x = 12 \\ x = 2 \end{gathered}$$

But then $y = 2x - 4 = 2(2) - 4 = 4 - 4 = 0$*. Therefore, the solution is* $(x, y) = (2, 0)$*, i.e.* $x = 2$ *and* $y = 0$*.*

We verify this by checking that it satisfies both equations:

$$\begin{array}{rr} 2x - y = 4 & 4x + y = 8 \\ 2(2) - 0 \stackrel{?}{=} 4 & 4(2) + 0 \stackrel{?}{=} 8 \\ 4 - 0 \stackrel{?}{=} 4 & 8 + 0 \stackrel{?}{=} 8 \\ 4 = 4 & 8 = 8 \end{array}$$