System of Equations (Elimination)

Each of the following systems has a solution. Determine the solution to the system by eliminating one of the variables.

1. $\begin{cases} x + 3 = y \\ 3x + 4y = 7 \end{cases}$

2. $\begin{cases} 4x - 3y = 16 \\ -2x + 4y = -2 \end{cases}$

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1. $\begin{cases} x + 3 = y \\ 3x + 4y = 7 \end{cases}$

$3x + 4(x + 3) = 7$
$3x + 4x + 12 = 7$
$7x + 12 = 7$
$7x = -5$
$x = -\dfrac{5}{7}$

$-\dfrac{5}{7} + 3 = y$
$\dfrac{16}{7} = y$

The solution is $\left(-\dfrac{5}{7}, \dfrac{16}{7}\right)$.

2. $\begin{cases} 4x - 3y = 16 \\ -2x + 4y = -2 \end{cases}$

$2(-2x + 4y = -2)$
$-4x + 8y = -4$

$\begin{cases} 4x - 3y = 16 \\ -4x + 8y = -4 \end{cases}$

$4x - 3y - 4x + 8y = 16 - 4$
$-3y + 8y = 12$
$5y = 12$
$y = \dfrac{12}{5}$

$4x - 3\left(\dfrac{12}{5}\right) = 16$
$4x - \dfrac{36}{5} = 16$
$4x = \dfrac{116}{5}$
$x = \dfrac{29}{5}$

The solution is $\left(\dfrac{29}{5}, \dfrac{12}{5}\right)$.

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