WARM - UP

Level 1 Problem!

Solve this system by the substitution method.

$$\begin{cases} 2x + y = -5 \\ -6x + y = x^2 + 7 \end{cases}$$

$y = -2x - 5$

$-6x - 2x - 5 = x^2 + 7$

$-8x - 5 = x^2 + 7$

$0 = x^2 + 8x + 12$

$0 = (x+6)(x+2)$

$x = -6$: $y = -2(-6) - 5$

$x = -2$: $y = -2(-2) - 5$

$(-6, 7)$

$(-2, -1)$

Check Point 2 Solve by the substitution method:

$$\begin{cases} x + 2y = 0 \\ (x-1)^2 + (y-1)^2 = 5. \end{cases}$$

$x = -2y$

$-2y$

$(-2y-1)^2 + (y-1)^2 = 5$

$4y^2 + 4y + 1 + y^2 - 2y + 1 = 5$

$5y^2 + 2y + 2 = 5$

$5y^2 + 2y - 3 = 0$ Factor.

$(5y-3)(y+1) = 0$

$y = -1$: $x = -2(-1)$

$x = 2$

$y = \frac{3}{5}$: $x = -2\left(\frac{3}{5}\right)$

$x = -\frac{6}{5}$.

$(2, -1)$

$\left(-\frac{6}{5}, \frac{3}{5}\right)$

One more example! --- Solve by substitution.

$$\begin{cases} -4x + y = 12 \\ y = x^3 + 3x^2 \end{cases}$$

$y = 4x + 12$

$4x + 12 = x^3 + 3x^2$

$0 = x^3 + 3x^2 - 4x - 12$

$0 = x^2(x+3) - 4(x+3)$

$0 = (x^2 - 4)(x+3)$

$0 = (x+2)(x-2)(x+3)$

$x = -2$: $y = 4(-2) + 12 = y = 4$.

$x = 2$: $y = 4(2) + 12 = y = 20$.

$x = -3$: $y = 4(-3) + 12 = y = 0$.

$(-2, 4)$ $(2, 20)$ $(-3, 0)$