

Solving Non-Linear Systems of Equations  
Homework

Name: Key

Solve each of the following systems of equations by substitution or elimination.

$$1) \begin{cases} y = x^2 + 3x - 5 \\ -x + y = 3 \end{cases} \quad y = x + 3$$

$$x + 3 = x^2 + 3x - 5$$

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

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

$$x = -4 \quad x = 2$$

$$(-4, -1) \quad (2, 5)$$

$$2) \begin{cases} y = x^2 - 4x + 6 \\ -x + y = 2 \end{cases} \quad y = x + 2$$

$$x + 2 = x^2 - 4x + 6$$

$$0 = x^2 - 5x + 4$$

$$(x-4)(x-1) = 0$$

$$x = 4 \quad x = 1$$

$$(4, 6) \quad (1, 3)$$

$$3) \begin{cases} x^2 - y = 24 \\ (x - y = 12) - 1 \end{cases}$$

$$+ \quad -x + y = -12$$

$$x^2 - x = 12$$

$$x^2 - x - 12 = 0$$

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

$$x = 4 \quad x = -3$$

$$(4, -8) \quad (-3, -15)$$

$$5) \begin{cases} x^2 - y = 20 \\ (x - y = 8) - 1 \end{cases}$$

$$+ \quad -x + y = -8$$

$$x^2 - x = 12$$

$$x^2 - x - 12 = 0$$

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

$$(4, -4) \quad (-3, -11)$$

$$7) \begin{cases} y = x^2 + 6x - 17 \\ y = 3x - 7 \end{cases}$$

$$3x - 7 = x^2 + 6x - 17$$

$$0 = x^2 + 3x - 10$$

$$(x+5)(x-2) = 0$$

$$x = -5 \quad x = 2$$

$$(-5, -22) \quad (2, -1)$$

$$4) \begin{cases} y = x^2 + 6x + 10 \\ y = -2x - 6 \end{cases}$$

$$-2x - 6 = x^2 + 6x + 10$$

$$0 = x^2 + 8x + 16$$

$$(x+4)(x+4) = 0$$

$$x = -4$$

$$(-4, 2)$$

$$6) \begin{cases} y = x^2 + 7x - 5 \\ y = 2x + 9 \end{cases}$$

$$2x + 9 = x^2 + 7x - 5$$

$$0 = x^2 + 5x - 14$$

$$(x+7)(x-2) = 0$$

$$x = -7 \quad x = 2$$

$$(-7, -5) \quad (2, 13)$$

$$8) \begin{cases} y = x^2 + 8x + 12 \\ y = -3x - 6 \end{cases}$$

$$-3x - 6 = x^2 + 8x + 12$$

$$0 = x^2 + 11x + 18$$

$$(x+9)(x+2) = 0$$

$$x = -9 \quad x = -2$$

$$(-9, 21) \quad (-2, 0)$$