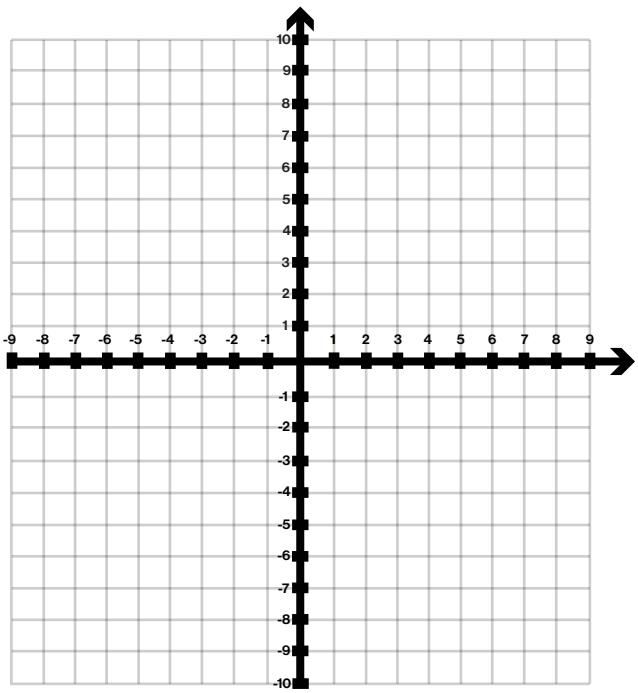
Nonlinear Systems of Equations Practice

Name: _____ Date: _____

Question 1

Solve

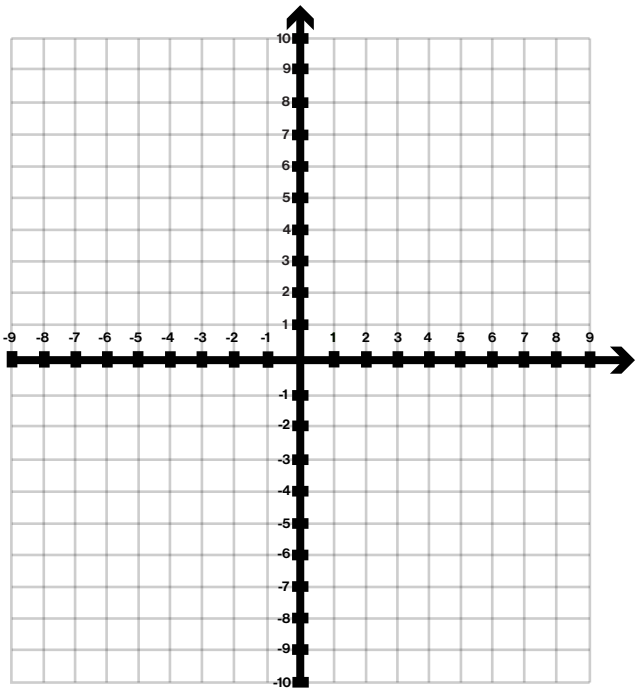
1. $y^2 + x^2 = 41$
   $y - x = 1$



Nonlinear Systems of Equations Practice

II. $2y^2 + xy + x^2 = 7$

$x - 2y = 5$



Nonlinear Systems of Equations Practice

III. $x^2 + y^2 = 4$
$9x^2 + 16y^2 = 144$

Nonlinear Systems of Equations Practice

IV. $xy - y^2 = 2$
$2xy - 3y^2 = 0$

Nonlinear Systems of Equations Practice

Name: **Key** Date: _____

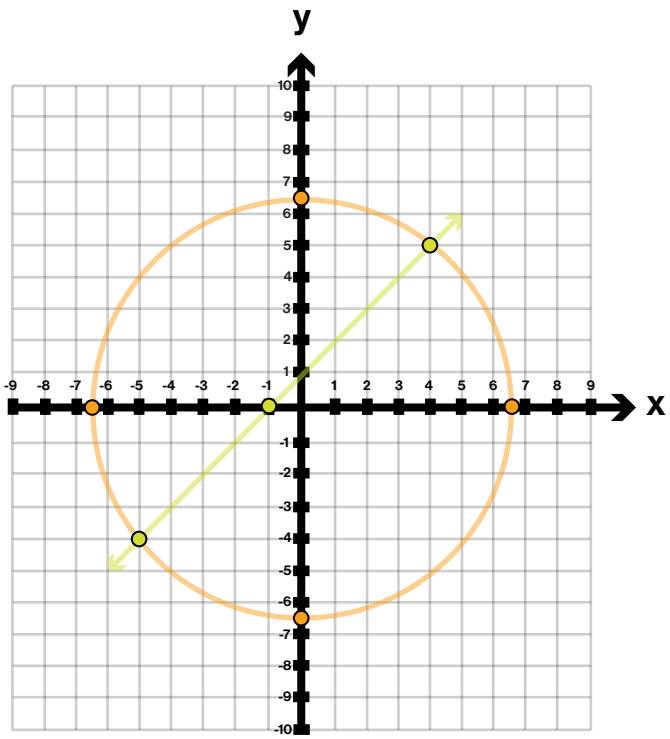
Question 1

Solve

1. $y^2 + x^2 = 41$, $y - x = 1$ $\longrightarrow$ $y^2 + x^2 = 41$, $y = 1 + x$ $\longrightarrow$ $(1+x)^2 + x^2 = 41$ $\longrightarrow$ $2x^2 + 2x + 1 = 41$ $\longrightarrow$ $2x^2 + 2x - 40 = 0$

$$x = \frac{-(2) + \sqrt{(2)^2 - 4(2)(-40)}}{2(2)} = 4 \longrightarrow y = 1 + (4) \longrightarrow y = 5 \longrightarrow (4, 5)$$

$$x = \frac{-(2) - \sqrt{(2)^2 - 4(2)(-40)}}{2(2)} = -5 \longrightarrow y = 1 + (-5) \longrightarrow y = -4 \longrightarrow (-5, -4)$$



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11. $2y^2 + xy + x^2 = 7$, $x - 2y = 5$ $\longrightarrow$ $2y^2 + xy + x^2 = 7$, $x = 5 + 2y$ $\longrightarrow$ $2y^2 + (5 + 2y)y + (5 + 2y)^2 = 7$

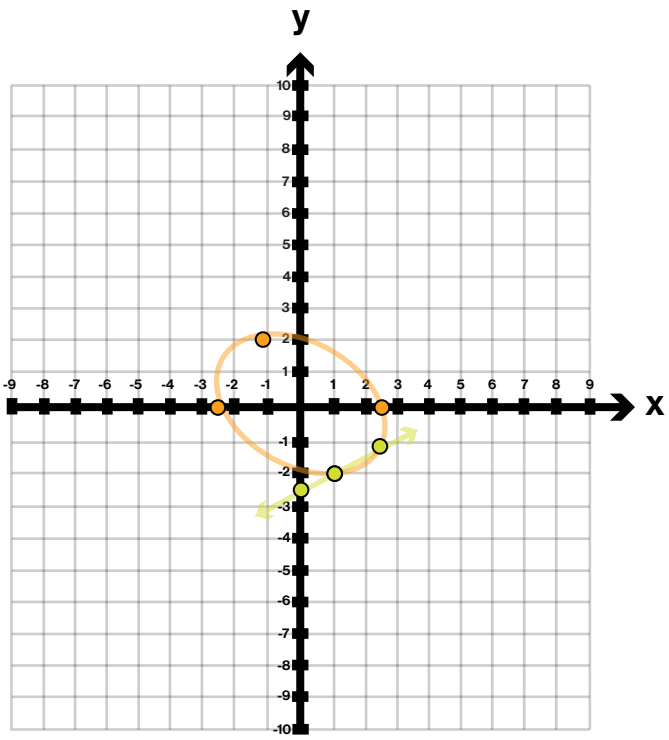
$\downarrow$

$8y^2 + 25y + 18 = 0$ $\longleftarrow$ $8y^2 + 25y + 25 = 7$ $\longleftarrow$ $2y^2 + (5 + 2y)y + (5 + 2y)^2 = 7$

$\downarrow$

$$y = \frac{-(25) + \sqrt{(25)^2 - 4(8)(18)}}{2(8)} = -1.125 \longrightarrow x = 5 + 2(-1.125) \longrightarrow x = 2.75 \longrightarrow (2.75, -1.125)$$

$$y = \frac{-(25) - \sqrt{(25)^2 - 4(8)(18)}}{2(8)} = -2 \longrightarrow x = 5 + 2(-2) \longrightarrow x = 1 \longrightarrow (1, -2)$$



Nonlinear Systems of Equations Practice

III. $x^2 + y^2 = 4$
$9x^2 + 16y^2 = 144$ $\longrightarrow$ $-16x^2 - 16y^2 = -64$
$9x^2 + 16y^2 = 144$
$-7x^2 = 80$ $\longrightarrow$ $x = \pm\sqrt{80 / -7}$ $\longrightarrow x = \pm \frac{4i\sqrt{35}}{7}$

$x^2 + y^2 = 4$
$9x^2 + 16y^2 = 144$ $\longrightarrow$ $-9x^2 - 9y^2 = -36$
$9x^2 + 16y^2 = 144$
$7y^2 = 108$ $\longrightarrow$ $y = \pm\sqrt{108 / 7}$ $\longrightarrow$ $y = \pm \frac{6\sqrt{21}}{7}$

$\left(\frac{4i\sqrt{35}}{7}, \frac{6\sqrt{21}}{7}\right)$ $\left(-\frac{4i\sqrt{35}}{7}, \frac{6\sqrt{21}}{7}\right)$

$\left(\frac{4i\sqrt{35}}{7}, -\frac{6\sqrt{21}}{7}\right)$ $\left(-\frac{4i\sqrt{35}}{7}, -\frac{6\sqrt{21}}{7}\right)$

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IV. $xy - y^2 = 2$
$2xy - 3y^2 = 0$ $\longrightarrow$ $-2xy + 2y^2 = -4$
$2xy - 3y^2 = 0$
$-y^2 = -4 \longrightarrow y^2 = 4 \longrightarrow y = \pm 2$

$x(2) - (2)^2 = 2 \longrightarrow x(2) - (2)^2 = 2 \longrightarrow 2x - 4 = 2 \longrightarrow x = 3$

$x(-2) - (-2)^2 = 2 \longrightarrow x(-2) - (-2)^2 = 2 \longrightarrow -2x - 4 = 2 \longrightarrow x = -3$

$(3, 2)$ $(-3, -2)$