ACTIVATE PRIOR KNOWLEDGE!!

Strategies:

- Graphing
- Substitution
- Elimination

Two linear equations involving two unknowns...

Example: Solve... $2x + y = 5$ & $3x - 4y = 2$

Substitution:

$y = 5 - 2x$

$3x - 4(5 - 2x) = 2$

$3x - 20 + 8x = 2$

$\frac{11x}{11} = \frac{22}{11}$

$x = 2$

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

$\boxed{(2, 1)}$

Elimination:

$2x + y = 5$

$3x - 4y = 2$

×4

$8x + 4y = 20$

Add

$3x - 4y = 2$

$\frac{11x}{11} = \frac{22}{11}$

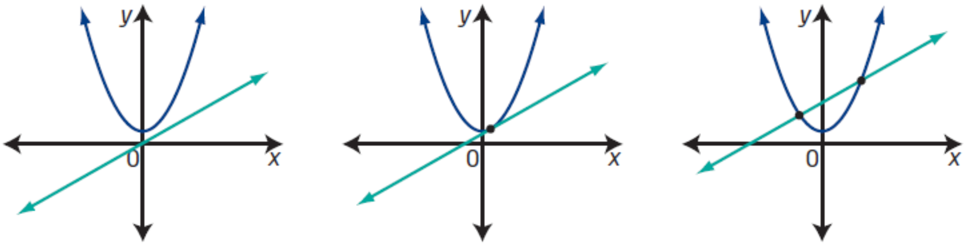
$x = 2 \Longrightarrow 2(2) + y = 5$

$y = 1$

$\boxed{(2, 1)}$

What about a linear-quadratic or a quadratic-quadratic system?

- Linear-quadratic

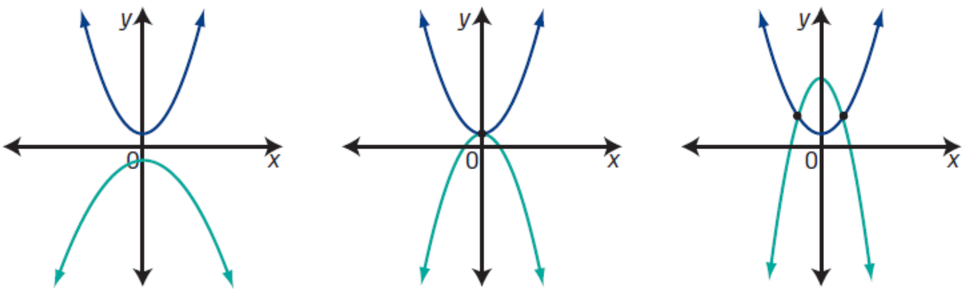


No point of intersection
No solution

One point of intersection
One solution

Two points of intersection
Two solutions

- Quadratic-quadratic



No point of intersection
No solution

One point of intersection
One solution

Two points of intersection
Two solutions

Can two parabolas that both open downward have no points of intersection? one point? two points? Explain how.

What would the graph of a system of quadratic-quadratic equations with an infinite number of solutions look like?

- Linear-Quadratic:

Solve: $p = 3k + 1$
$p = 6k^2 + 10k - 4$

$3k+1 = 6k^2+10k-4$

$0 = 6k^2+7k-5$ -30

$0 = 6k^2+10k-3k-5$

$0 = 2k(3k+5)-1(3k+5)$

$0 = (3k+5)(2k-1)$

$k = -\frac{5}{3}$ $k = \frac{1}{2}$

$p = 3\left(-\frac{5}{3}\right)+1$

$p = -4$

$\boxed{\left(-\frac{5}{3}, -4\right)}$

$p = 3\left(\frac{1}{2}\right)+1$

$p = \frac{5}{2}$

$\boxed{\left(\frac{1}{2}, \frac{5}{2}\right)}$

Solve the following system of equations:

$4x - y + 3 = 0$

$2x^2 + 8x - y + 3 = 0$

Verify your solution.

$2x^2 + 8x - y = -3$

$4x - y = -3$

$2x^2 + 4x = 0$

$2x(x+2) = 0$

$x = 0, -2$

$y = 4x + 3$

$y = 0 + 3$

$\boxed{(0,3)}$

$y = 4(-2) + 3$

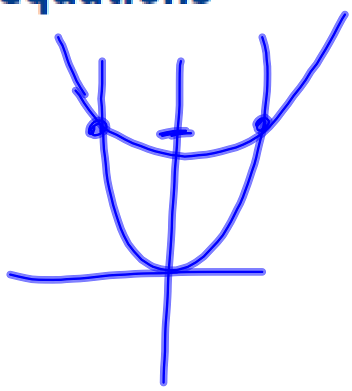
$y = -5$

$\boxed{(-2,-5)}$

Solve a System of Quadratic-Quadratic Equations

Solve: $2x^2 + 16x + y = -26$
$x^2 + 8x - y = -19$

$y =$



$3x^2 + 24x = -45$

$\frac{3x^2}{3} + \frac{24x}{3} + \frac{45}{3} = \frac{0}{3}$

$x^2 + 8x + 15 = 0$

$(x+5)(x+3) = 0$

$x = -5 \qquad x = -3$

$x^2 + 8x + 19 = y$

$\underline{x = -5}$

$y = 25 - 40 + 19$

$y = 4$

$(-5, 4)$

$\underline{x = -3}$

$y = 9 - 24 + 19$

$y = 4$

$(-3, 4)$

Solve: $y = (x+2)^2 - 1$

$y = x^2 - 4x - 5$

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

$-8x = 4 - 1 + 5$

$\frac{-8x}{-8} = \frac{8}{-8}$

$x = -1 \Rightarrow y = 1 + 4 - 5$

$y = 0$

$(-1, 0)$

$y = \frac{1}{2}(x-2)^2 + 4$ and $y = (x-2)^2 + 2$

$(2)\ (x-2)^2 + 2 = \frac{1}{\cancel{2}}(x-2)^2 + 4\ (2)$

$2(x-2)^2 + 4 = (x-2)^2 + 8$ $\qquad 2m^2 + 4 = m^2 + 8$

$\sqrt{(x-2)^2} = \sqrt{4}$

$x - 2 = \pm 2$

$x = 2 \pm 2$

$x = 4$ or 0 $\Rightarrow y = (x-2)^2 + 2$

$y = 2^2 + 2$ $\qquad y = (-2)^2 + 2$

$y = 6$ $\qquad y = 6$

$\boxed{(4,6)}$ $\qquad \boxed{(0,6)}$

$$y = x^2 - 4x + 7$$
$$2x^2 + y = -4(x+1)$$

$2x^2 + (x^2 - 4x + 7) = -4(x+1)$

$3x^2 - 4x + 7 = -4x - 4$

$3x^2 + 11 = 0$

$3x^2 = -11$

$\sqrt{x^2} = \sqrt{-\frac{11}{3}}$ ← **No Solutions**

Practice problems:

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#3, 4, 5, 7, 8, 9, 10, 13, 16, 19, 20