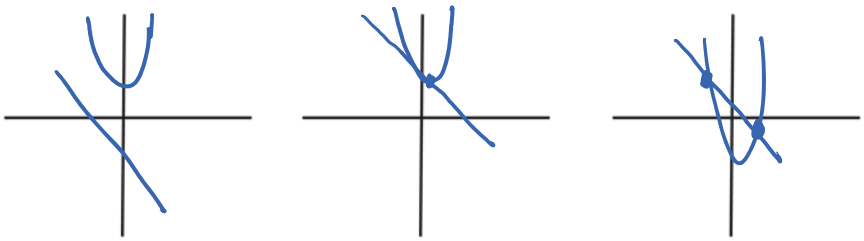
## 5.5 Solving Systems of Equations

A solution of a linear-quadratic system of equations is an ordered pair, $(x,y)$, that satisfies both equations in the system. The system may have

0, 1, or 2 solutions.



**Example #1:** Solve this system.

① $y = \frac{1}{3}x^2 - 3$

② $x + y = -3$ → $y = -x - 3$

Sub ② into ①

$-x - 3 = \frac{1}{3}x^2 - 3$

$+x \quad +3 \qquad +x \quad +3$

$0 = \frac{1}{3}x^2 + x$

$0 = x\left(\frac{1}{3}x + 1\right)$

$x = 0$ $\qquad$ $x = -3$

To determine y, substitute x-values into original equation: $x + y = -3$

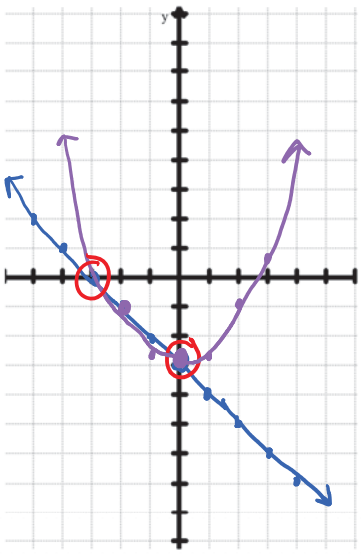
$0 + y = -3$

$y = -3$

$-3 + y = -3$

$+3 \qquad +3$

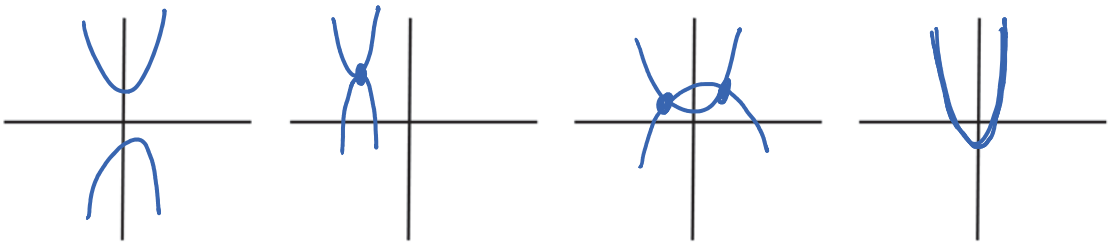
$y = 0$



Solutions: (0, -3)
(-3, 0)

A solution of a quadratic-quadratic system of equations is an ordered pair, $(x, y)$, that satisfies both equations in the system. The system may have

0, 1, 2 or infinitely many solutions.



0 1 2 ∞

**Example #2:** Solve this system.

① $y = (x+2)^2 - 1$
② $y = x^2 - 4x - 5$

Sub ② into ①

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

$(x+2)(x+2) - 1$

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

$x^2 + 4x + 3 = x^2 - 4x - 5$

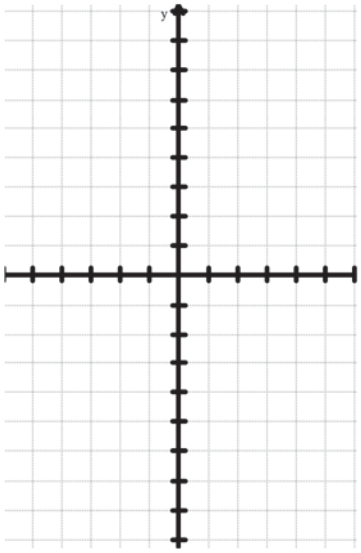
$-x^2 - 4x - 3 \quad -x^2 - 4x - 3$

$0 = -8x - 8$

$+8 \qquad +8$

$8 = -8x$

$\boxed{x = -1}$



To determine y, sub $x = -1$ into either equation

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

$y = 1^2 - 1$

$y = 0$

$\therefore$ Solution $(-1, 0)$