HW: A23 pg. 221 #6-12, 16-19, 23

13.1/13.2 Systems of Quadratic and Linear Equations

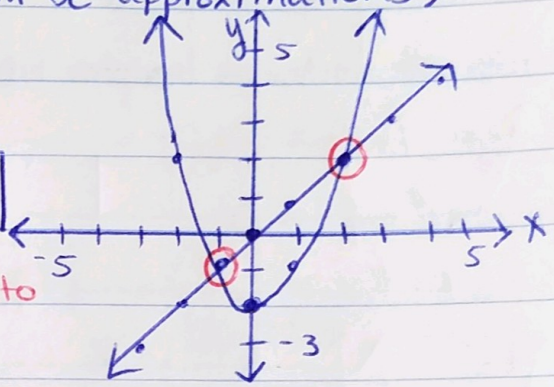
Solving a System Graphically

① Graph both equations as precisely as possible.

② The solutions will be the intersection points (on most of your homework, they will be approximations).

Ex #1 $\begin{cases} y = x \\ y = x^2 - 2 \end{cases}$

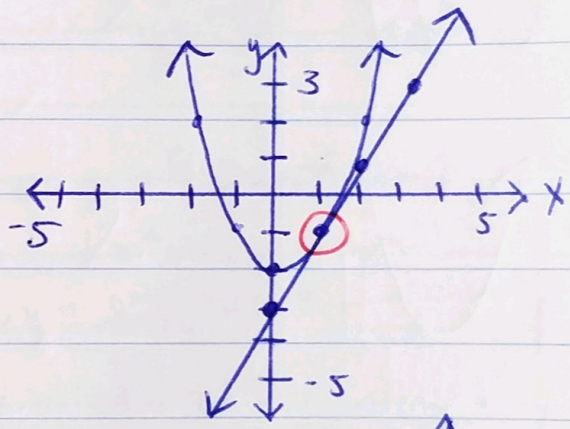
Solutions: (-1,-1) & (2,2)



If you plug in either of these into both equations, it will work for both equations.

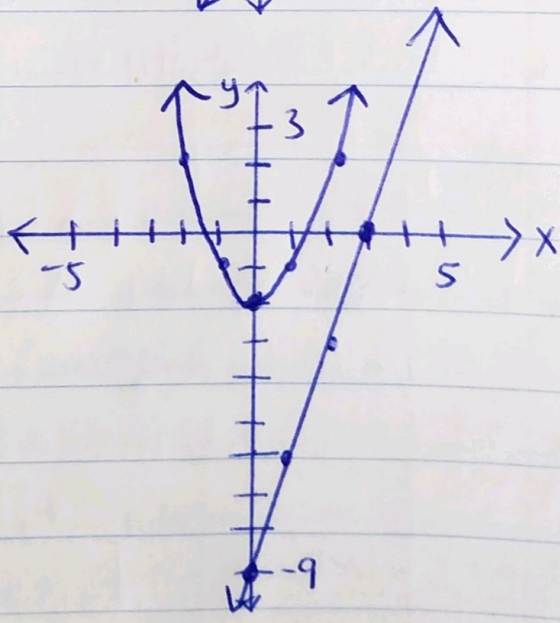
Ex #2 $\begin{cases} y = 2x - 3 \\ y = x^2 - 2 \end{cases}$

Solution: (1,-1)



Ex #3 $\begin{cases} y = x^2 - 2 \\ y = 3x - 9 \end{cases}$

No solution



Solving a System Algebraically

① Set equations equal to each other.

② Move everything to one side so equation = 0 & simplify.

③ Solve for x (quadratic formula, factoring, complete the square).

④ Plug x-values from ③ into an original equation to get y-values.

Ex #4 $\begin{cases} y = -2x - 7 \\ y = -2x^2 + 4x + 1 \end{cases}$

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

$+2x \quad +1 \qquad +2x \quad +7$

$0 = -2x^2 + 6x + 8$

$\frac{0}{-2} = \frac{-2x^2}{-2} + \frac{6x}{-2} + \frac{8}{-2}$

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

$x = \frac{3 \pm \sqrt{9+16}}{2} = \frac{3 \pm 5}{2}$ → 4, −1

$y = -2(4) - 7$ $\quad y = -2(-1) - 7$

$y = -15$ $\quad y = -5$

Solutions: (4, −15) & (−1, −5)

Ex #5 $\begin{cases} y = x^2 + 6x + 5 \\ y = 2x + 1 \end{cases}$

$x^2 + 6x + 5 = 2x + 1$

$-2x \quad -1 \qquad -2x \quad +1$

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

$x = \frac{-4 \pm \sqrt{16 - 16}}{2} = \frac{-4}{2} = -2$

$y = 2(-2) + 1$

$y = -3$

Solution: (−2, −3)

Ex #6 $\begin{cases} y = \frac{1}{2}(x+4)^2 + 5 \\ y = \frac{17}{2} - x \end{cases}$

$2\left(\frac{1}{2}(x+4)^2 + 5 = \frac{17}{2} - x\right)$

$(x+4)^2 + 10 = 17 - 2x$

$(x+4)(x+4) + 10 = 17 - 2x$

$x^2 + 8x + 16 + 10 = 17 - 2x$

$+2x \qquad -17 \qquad -17 \quad +2x$

$x^2 + 10x + 9 = 0$

$x = \frac{-10 \pm \sqrt{100 - 36}}{2} = \frac{-10 \pm 8}{2}$ → −9, −1

$y = \frac{17}{2} - (-9)$ $\quad y = \frac{17}{2} - (-1)$

$y = \frac{17}{2} - \left(-\frac{18}{2}\right)$ $\quad y = \frac{17}{2} - \left(-\frac{2}{2}\right)$

$y = \frac{35}{2}$ $\quad y = \frac{19}{2}$

Solutions: $\left(-9, \frac{35}{2}\right)$ & $\left(-1, \frac{19}{2}\right)$