"Solving one equations"

Solve: aka find the value of x that makes a true statement.

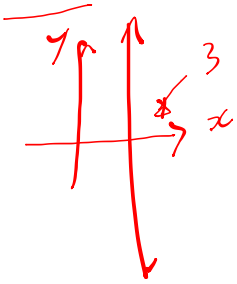
Solve:

$$x + 2 = 5$$

$$3 + 2 = 5$$

$$5 = 5 \rightarrow x = 3$$

First degree equation:
Isolate x by performing opposite operations



↳ to solve for 2 unknowns, you must have 2 equations

Solve: → not solvable cuz there's an infinite amount of solutions

$x + y = 3$

$y - x = 0$

$y = x$

(1.5, 1.5)

p.o.I

solutions

x y

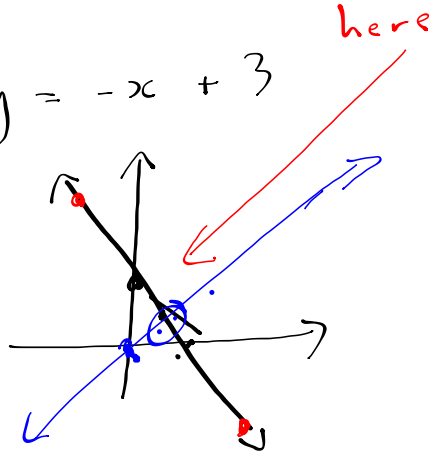
(3, 0)

(1, 2)

(2, 1)

$y = -x + 3$

here



Unit 1: Solving a system of equations by Finding the point of intersection (POI) (aka graph!)

$m = \frac{\text{rise}}{\text{run}} = \frac{1}{1}$

Solve

① $y - x = 0$

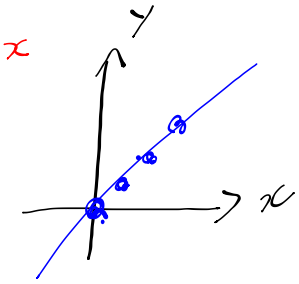
② $y - 2 = -x$

First step for graphing isolate y!

① $y - x = 0$ (+x, +x)

$y = mx + b$

$y = x$



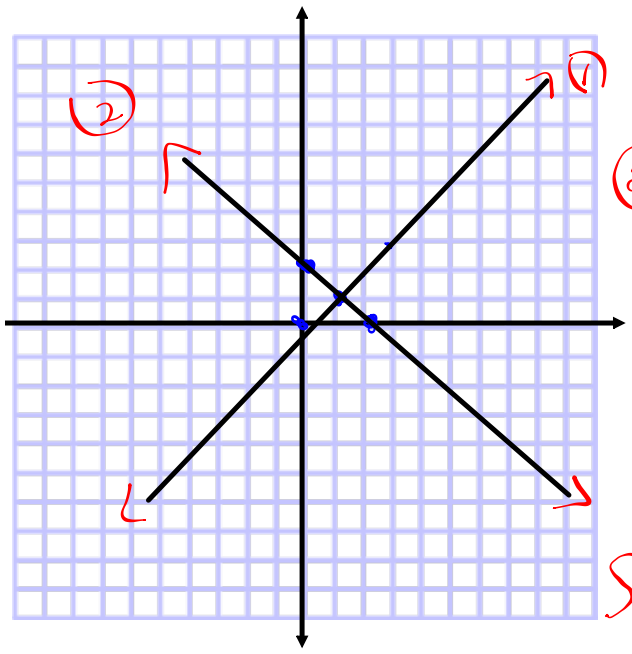
Then identify y-int and slope (rate of change)

② $y - 2 = -x$ (+2, +2)

$y = mx + b$

$y = -x + 2$

x	y
0	$-(0)+2 = 2$
1	$-(1)+2 = 1$
2	$-(2)+2 = 0$



Solution (1,1)

Solve:

$y - 3 = -x$

$\frac{y}{2} + 2 = -\frac{y}{4}$

Check sub in (1,1) into ① &

$y = x$

$1 = 1$ True

$y = -x + 2$

$1 = -1 + 2$

$1 = 1$ True

Solve

① $2x - y + 9 = 0$

② $y = x^2 + 4x + 9$

$ax^2 + bx + c$

First find

$V\left(\frac{-b}{2a}, \frac{-D}{4a}\right)$ $D = b^2 - 4ac$

x	y
0	$0^2 + 4(0) + 9 = 9$
-1	$(-1)^2 + 4(-1) + 9 = 6$
-2	5
-3	$(-3)^2 + 4(-3) + 9 = 6$
-4	$(-4)^2 + 4(-4) + 9 = 9$

V

$V(-2, 5)$

$-9 \quad -9$

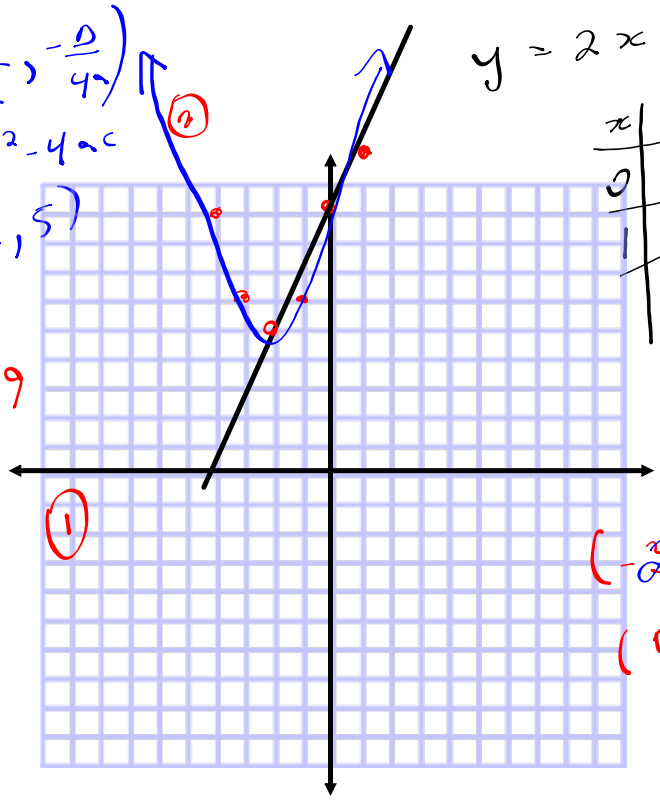
$2x - y = -9$

$+9 \quad +y \quad +9 \quad +y$

$2x + 9 = y$

$y = 2x + 9$

x	y
0	$2(0) + 9 = 9$
1	$2(1) + 9 = 11$



$(-2, 5)$ check

$(0, 9)$

$y = 2x + 9$

$6 = 2(-3) + 9$

$6 = -6 + 9$

$6 = 3$ FALSE

Solve

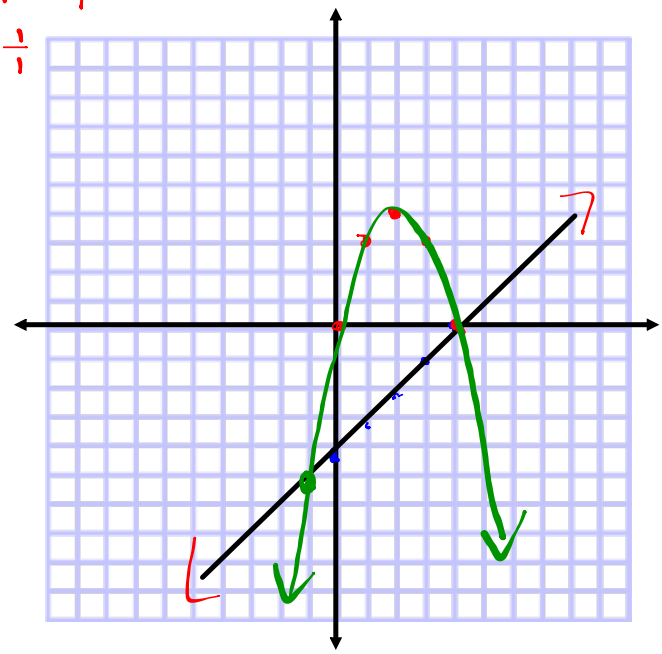
$y = -(x-2)^2 + 4$

$y = a(x-h)^2 + k \quad (h,k)$ V

$y = x - 4$

y-int: -4

$m = \frac{1}{1}$



-1, -5

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

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

V

x	y
0	$-(0-2)^2+4$
1	$-(1-2)^2+4$
2	4
3	$-(3-2)^2+4$
4	$-(4-2)^2+4$

0 = 3 = 3 = 0

$-(0-2)^2 + 4$

$-(-2)^2 + 4$

$-4 + 4$

0

Unit 2: Solving systems of equations algebraically

Steps for Comparison: (aka Comparison, Elimination, Substitution} method

ex. Solve

① $y = -(x-2)^2 + 4$

② $y + 4 = x$

Step ①: Isolate y in both equations:

② $y + 4 = x$ $-4 \quad -4$

$y = x - 4$

Step ②: Make one equation by putting the R.S. of the equations equal to each other.

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

Step ③: Solve for x by using the quadratic formula, by first evaluating and bring every thing to one side.

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

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

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

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

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

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

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

$ax^2 + bx + c = 0$

$a = 1$

$b = -3$

$c = -4$

$\Delta = b^2 - 4ac$

$\Delta = (-3)^2 - 4(1)(-4)$

$\Delta = 25$

$x = \frac{-b \pm \sqrt{\Delta}}{2a}$

$x = \frac{-(-3) + \sqrt{25}}{2(1)}$

$x = 4$

-or-

$x = \frac{-(-3) - \sqrt{25}}{2(1)}$

$x = -1$

Step ④: Find what y equals by subbing in what x equals into one of the original equations

Sub $x = 4$ into ②

$y = x - 4$

$y = 4 - 4$

$y = 0$

$(4, 0)$

Sub $x = -1$ into ②

$y = x - 4$

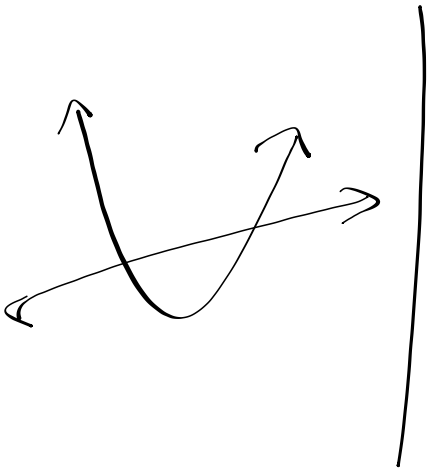
$y = -1 - 4$

$y = -5$

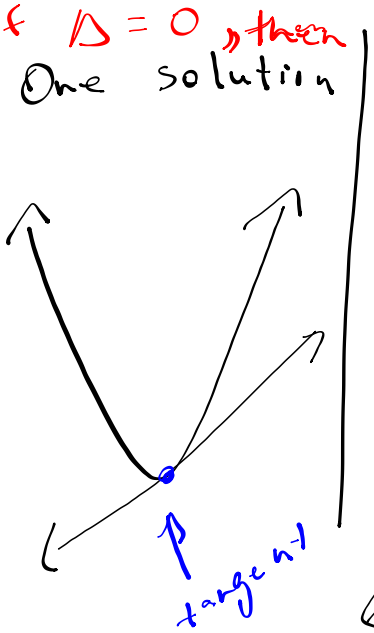
$(-1, -5)$

Solution Set = $\{(4,0), (-1,-5)\}$

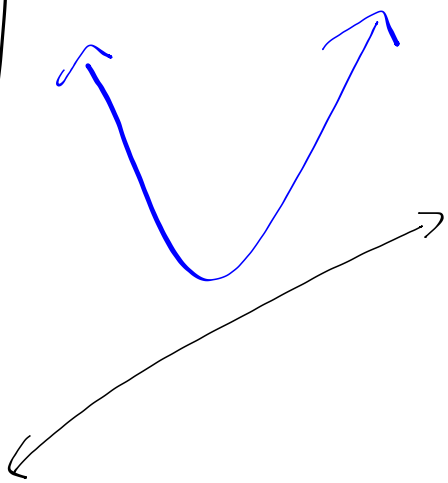
if $\Delta > 0$ then
Two solutions!



if $\Delta = 0$ then
One solution



if $\Delta < 0$ then
No solution
(disjoint)



Solve:

$$y = -2(x+3)^2 - 4$$

$$y - x = -8$$