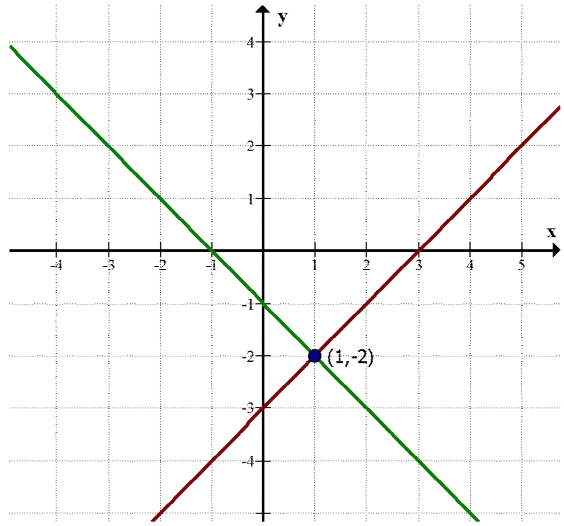
M10 - 8.1 - Number of Intersections System Notes

3 possible cases:

- one solution
- no solutions
- infinite number of solutions.

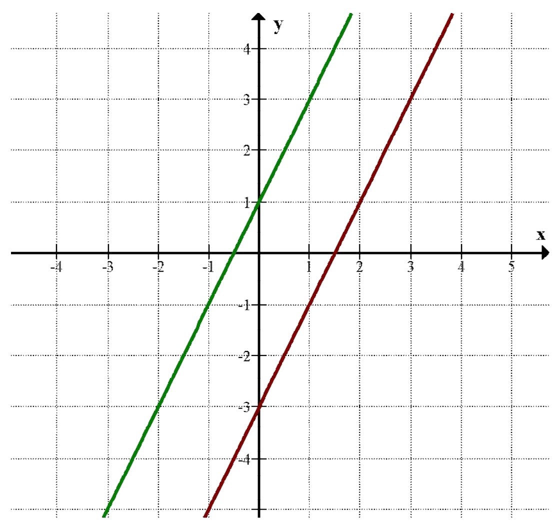


One Solution

$y = x - 3$ $\quad$ $y = -x - 1$

$m = 1$ $\quad$ $m = -1$ $\quad$ Different slopes

$b = -3$ $\quad$ $b = -1$

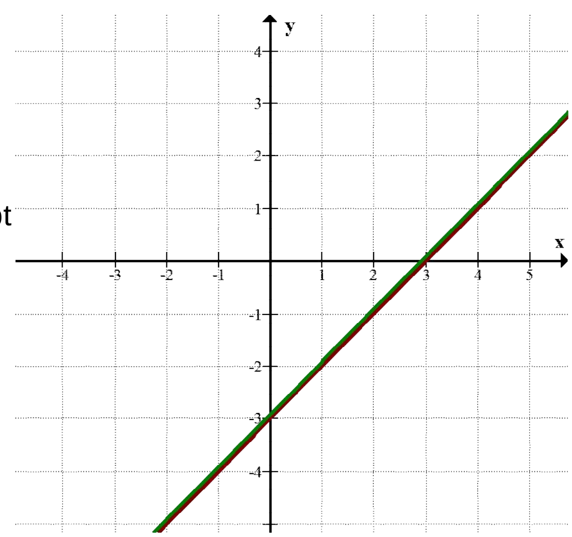


No Solutions $\quad$ Parallel Lines

$y = 2x - 3$ $\quad$ $y = 2x + 1$

$m = 2$ $\quad$ $m = 2$ $\quad$ Same slope

$b = -3$ $\quad$ $b = 1$ $\quad$ Different y-intercepts



Infinite Solutions

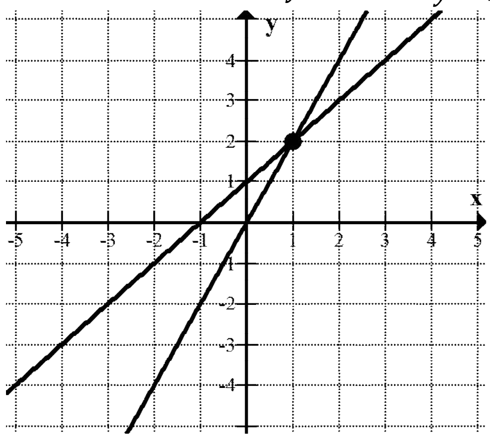
$y = x - 3$ $\quad$ $y = -3 + x$

$m = 1$ $\quad$ $m = 1$ $\quad$ Same slope

$b = -3$ $\quad$ $b = -3$ $\quad$ Same y-intercept

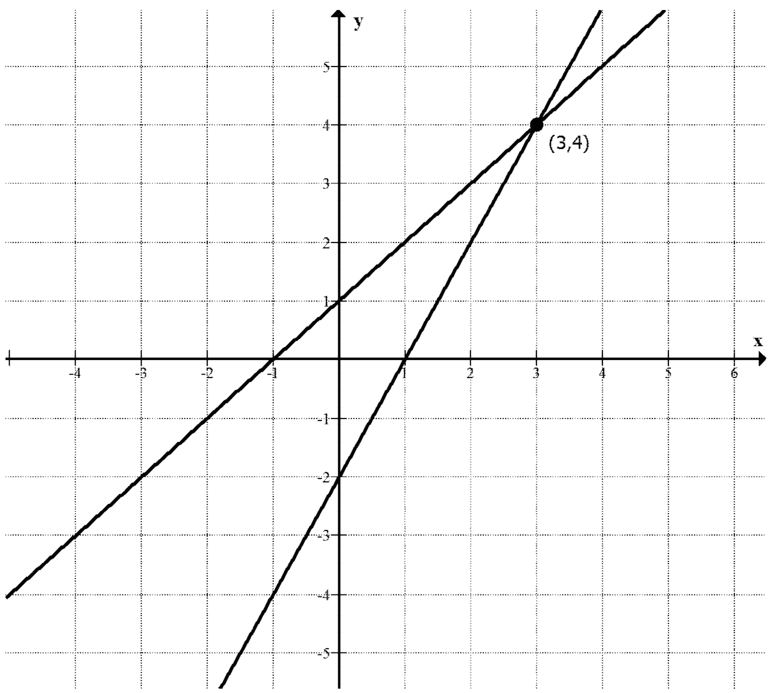
M10 - 8.2 - Solving Systems Graphically Notes

$y = 2x$ $\quad$ $y = x + 1$



Solution: (1,2)

$y = x + 1$ $\quad$ $y = 2x - 2$



Graph the lines

Find the point where the two lines cross.

Write down the point.

Solution: (3,4)

M10 - 8.2 - Solving Systems of Equations Graphically Notes

When we solve a system of equations we are determining a point of **intersection** between two lines.

To solve a system of equations graphically:

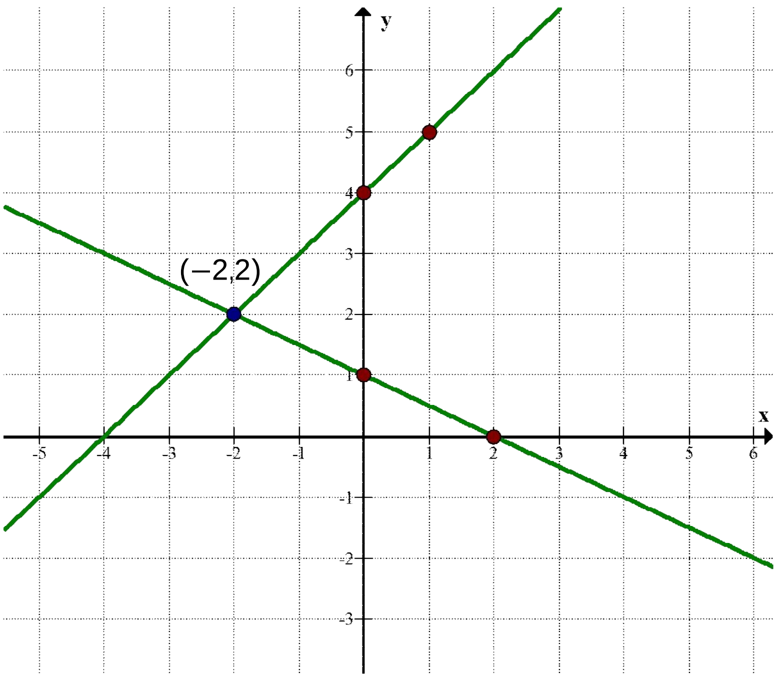
(1) $y + \frac{1}{2}x = 1$

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

(2) $y - x = 4$

(2) $y = x + 4$

Rewrite both equations in slope intercept form



Plot y-intercept

Plot $\frac{rise}{run}$ point

Draw the lines

Find the point where the two lines meet. That is the intersection and solution.

Solution: $(-2,2)$

Check your solution by substituting the point back in.

Equation 1

$y + \frac{1}{2}x = 1$

$(2) + \frac{1}{2}(-2) = 1$

$2 - 1 = 1$

$1 = 1$ √

$LHS = RHS$ ∎

Equation 2

$y - x = 4$

$(2) - (-2) = 4$

$2 + 2 = 4$

$4 = 4$ √

$LHS = RHS$ ∎

Left hand side should equal right hand side for both equations at the solution point.

M10 - 8.2 - Solving Systems of Equations Graphically Notes

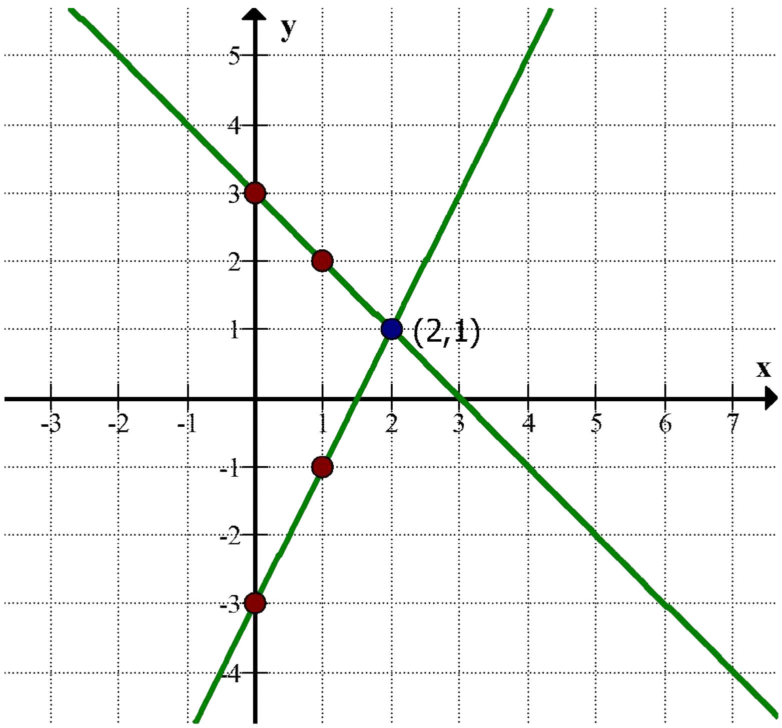
When we solve a system of equations we are determining a point of **intersection** between two lines.

To solve a system of equations graphically:

(1) $y + x = 3$ (2) $y - 2x = -3$

(1) $y = -x + 3$ (2) $y = 2x - 3$

Rewrite both equations in slope intercept form



Plot y-intercepts

Plot $\frac{rise}{run}$ point

Draw the lines

Find the point of intersection: The ordered pair that identifies the intersection is the solution.

Solution: (2,1)

Check Solution

Equation 1

$y + x = 3$

$(1) + (2) = 3$

$3 = 3$

$LHS = RHS$ ■

Equation 2

$y - 2x = -3$

$(1) - 2(2) = -3$

$1 - 4 = -3$

$-3 = -3$

$LHS = RHS$ ■

Left hand side should equal right hand side for both equations at the solution point.

M10 - 8.3 - Algebra Solving Systems of Equations Notes

Is (1,2) *a point on the line*?

$y = x + 1$

(1,2)
(x, y)

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

If it works it's a Point on the Line

Identify x *and* y

Substitute Point for x *and* y

Solve

x	y
-2	***-1***
0	***1***
1	***2***

(1,2)

Is (1,2) *a point on the line*?

$y = -x + 3$

(1,2)
(x, y)

$y = -x + 3$
$(2) = -(1) + 3$
$2 = 2$

If it works it's a Point on the Line

Identify x *and* y

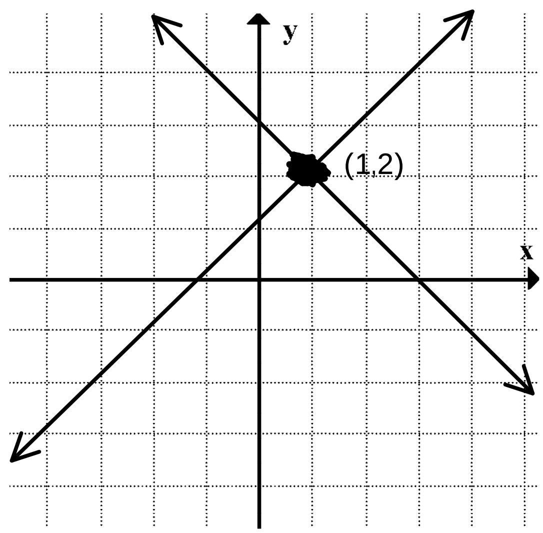
Substitute Point for x *and* y

Solve

x	y
-2	***5***
0	***3***
1	***2***

(1,2)

If it's is on both lines it must be the Intersection!



Is (1,3) *a point on the line*?

$y = x + 1$

(1,2)
(x, y)

$y = x + 1$
$(3) = (1) + 1$
$3 = 2$

If it doesn't work it's NOT a Point on the Line.

Identify x *and* y

Substitute Point for x *and* y

Solve

Therefore Not the intersection!