Graphing Systems of Linear Equations in Two Variables

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Sauyo High School

How to Graph Systems of Linear Equations Using the Intercepts?

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How to Interpret the Graphs of Systems of Linear Equations?

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Parallel	None	Inconsistent
Coinciding	Infinitely many	Consistent-Dependent
Intersecting	One	Consistent-Independent

Example 1

Graph, identify the kind of system, and describe the graph of the following system of linear equations:

$$\begin{cases} x + y = -2 \\ 2x + 2y = -4 \end{cases}$$

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Step 1: Identify the x-intercept and y-intercept of each equation in the system.

First equation $x + y = -2$

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Simplify	$x = -2$

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Coordinates	$(-2, 0)$

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Second equation $\quad 2x + 2y = -4$

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Step 2: Plot the intercepts of both equations on the same Cartesian plane.

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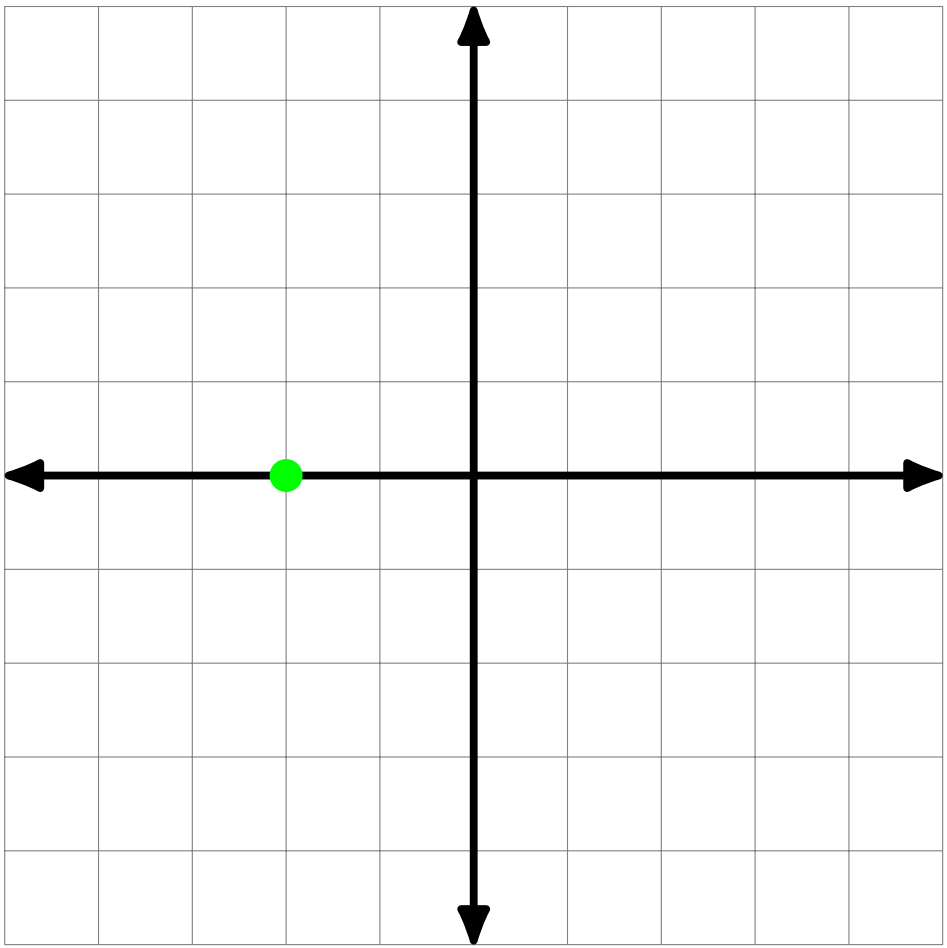

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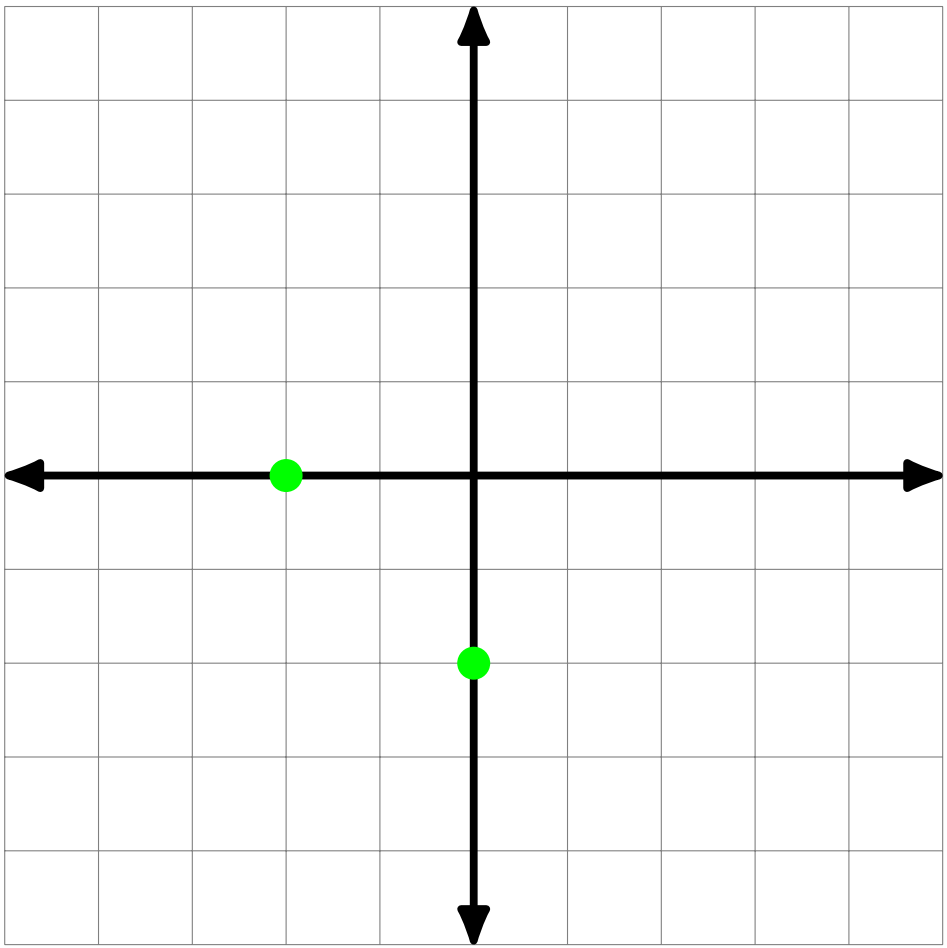

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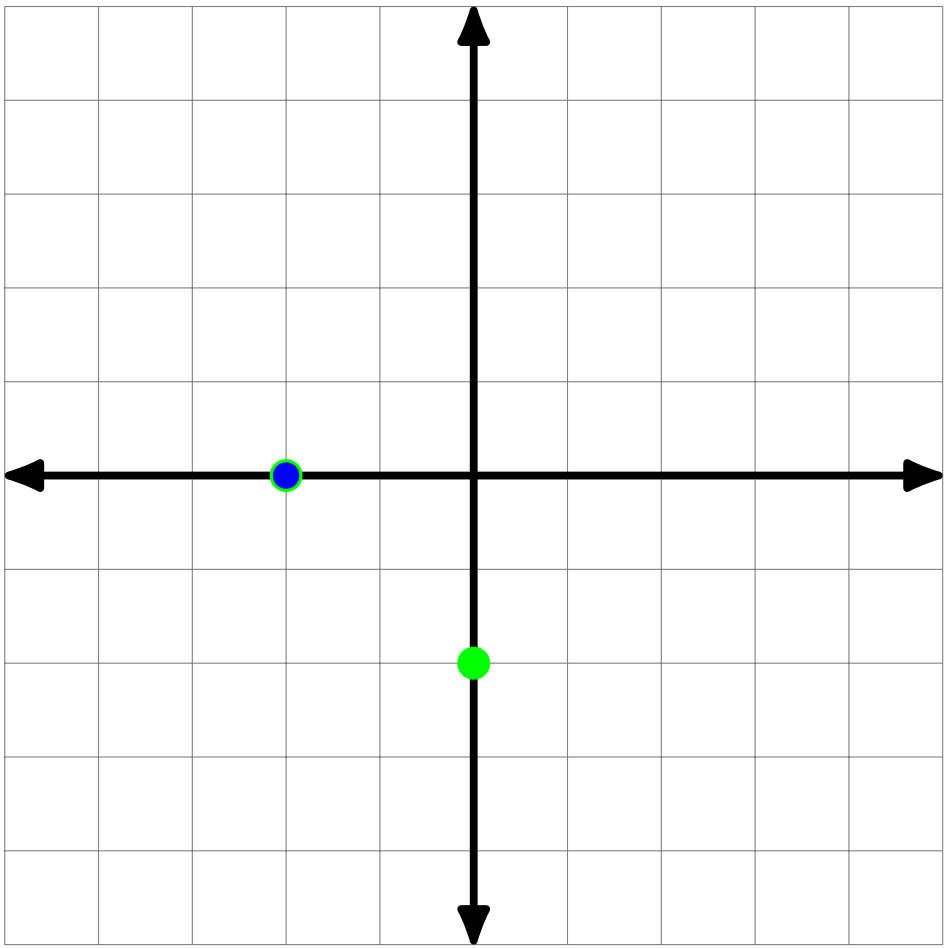

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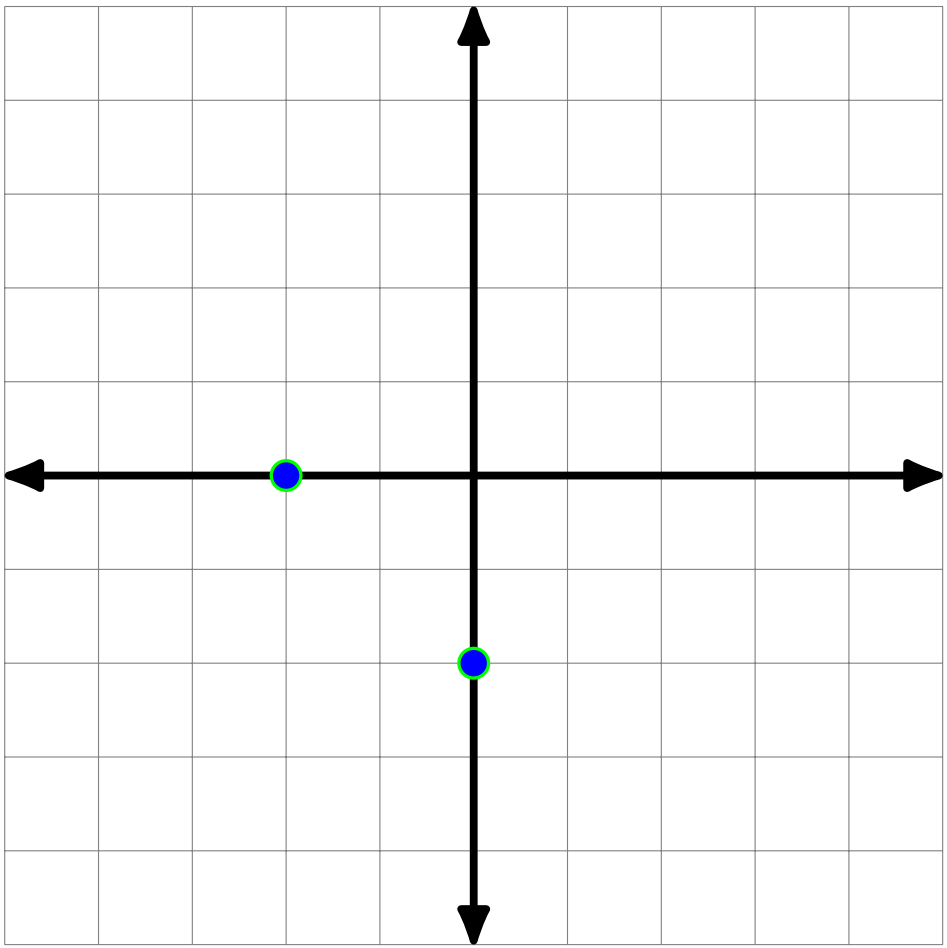

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Step 3: Connect the x-intercept and y-intercept.

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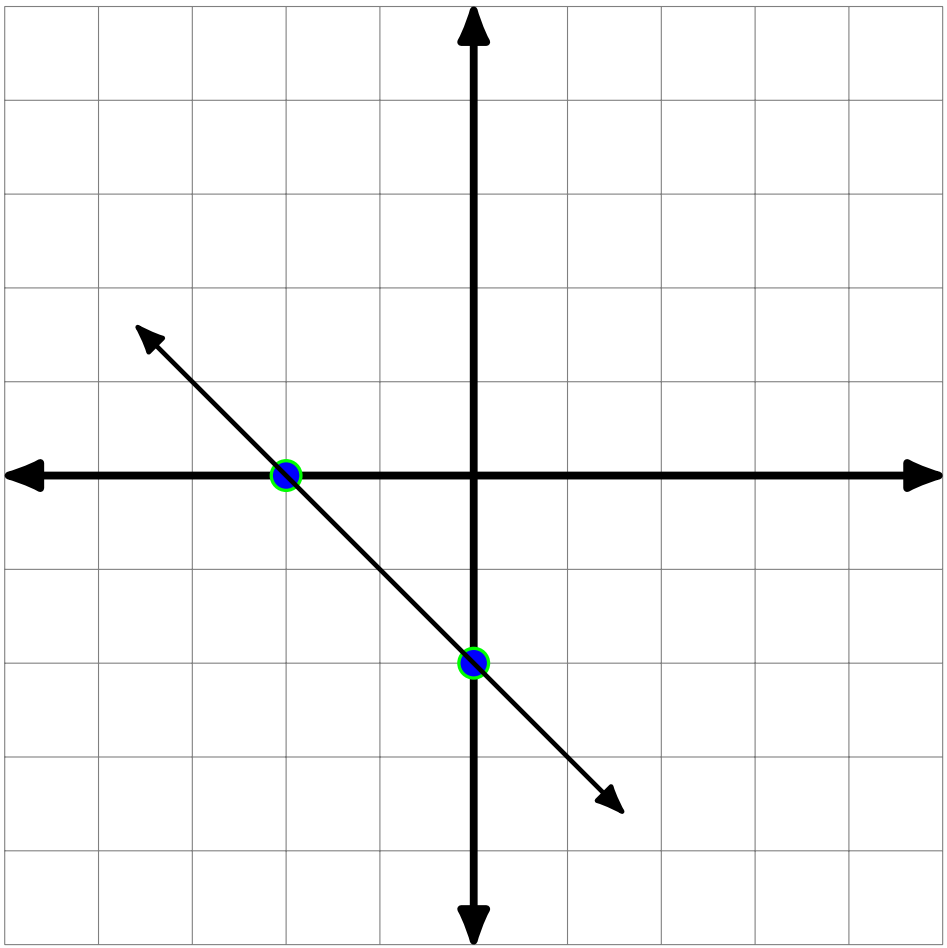

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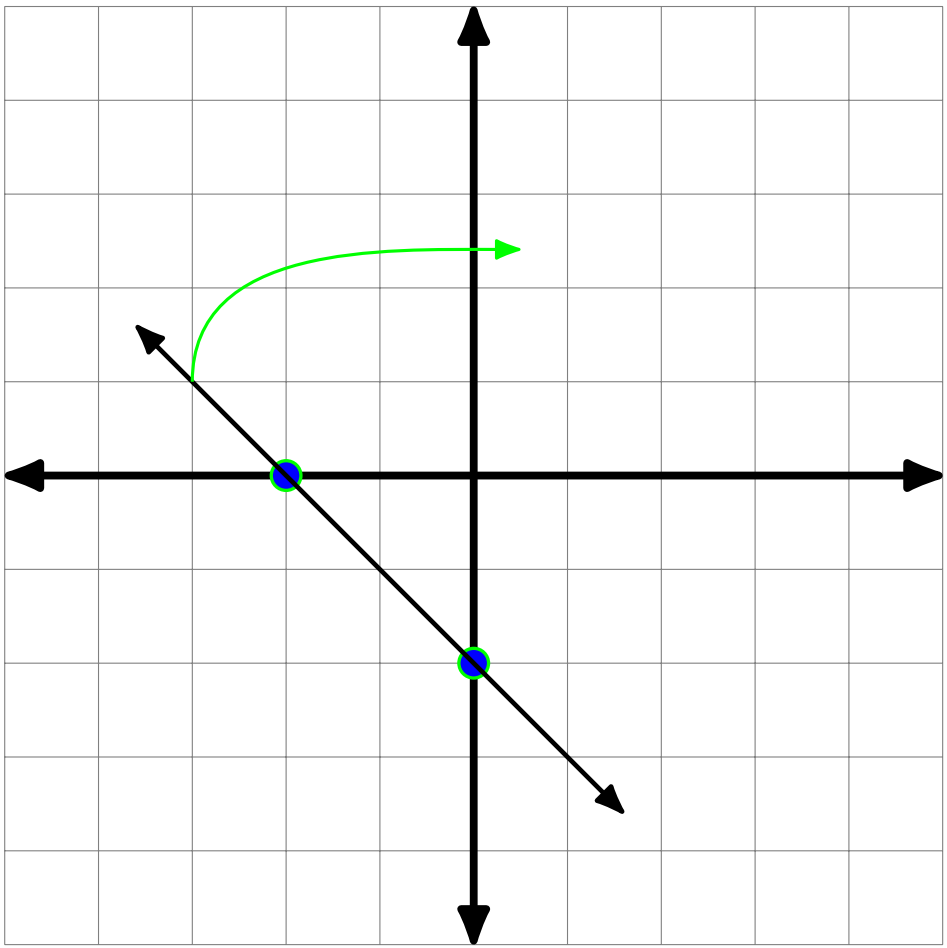

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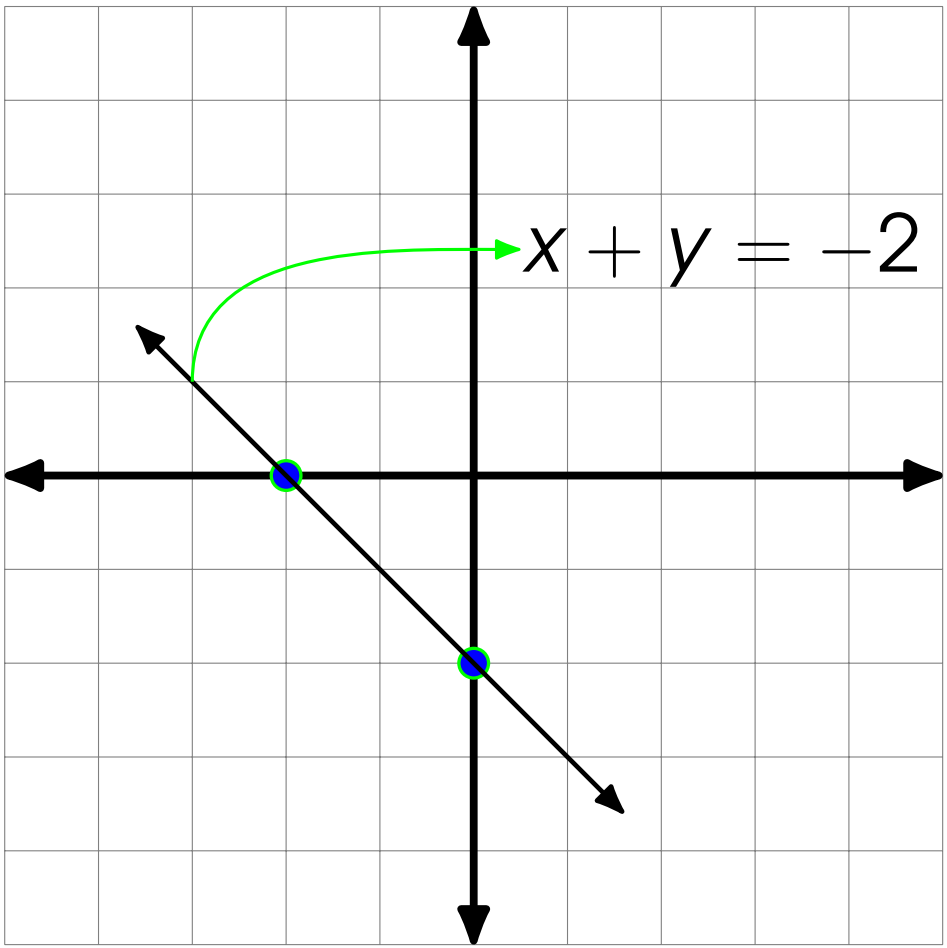

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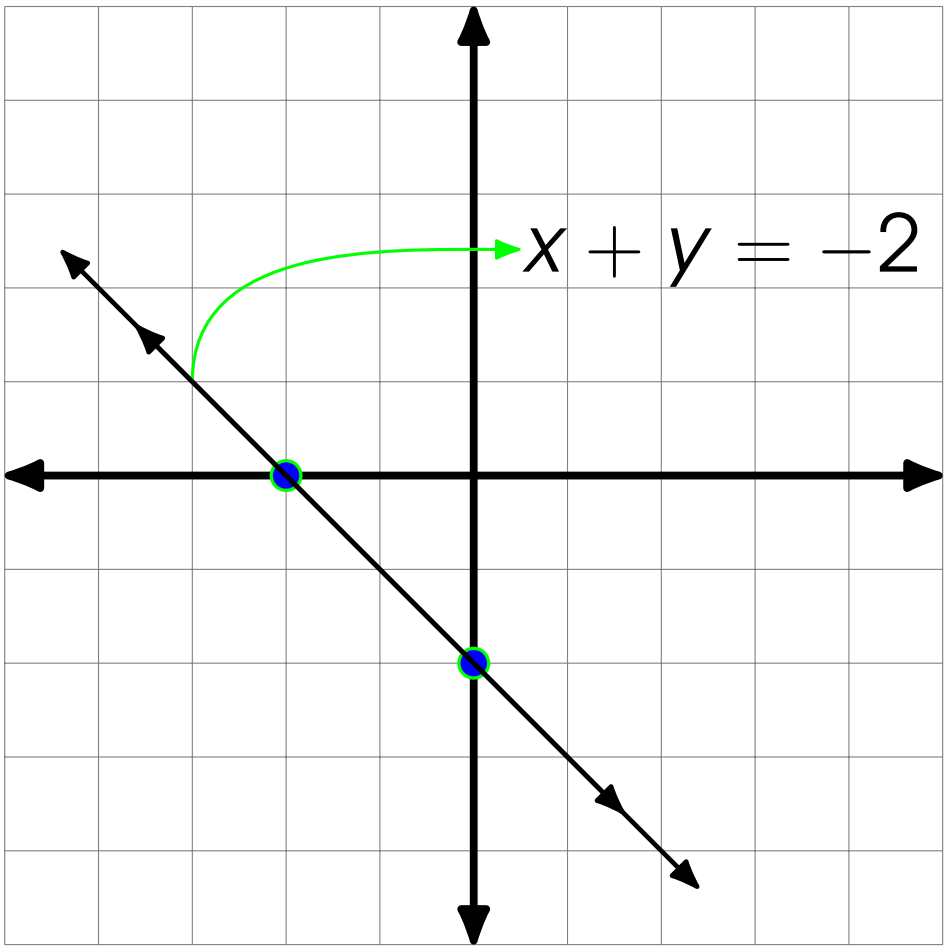

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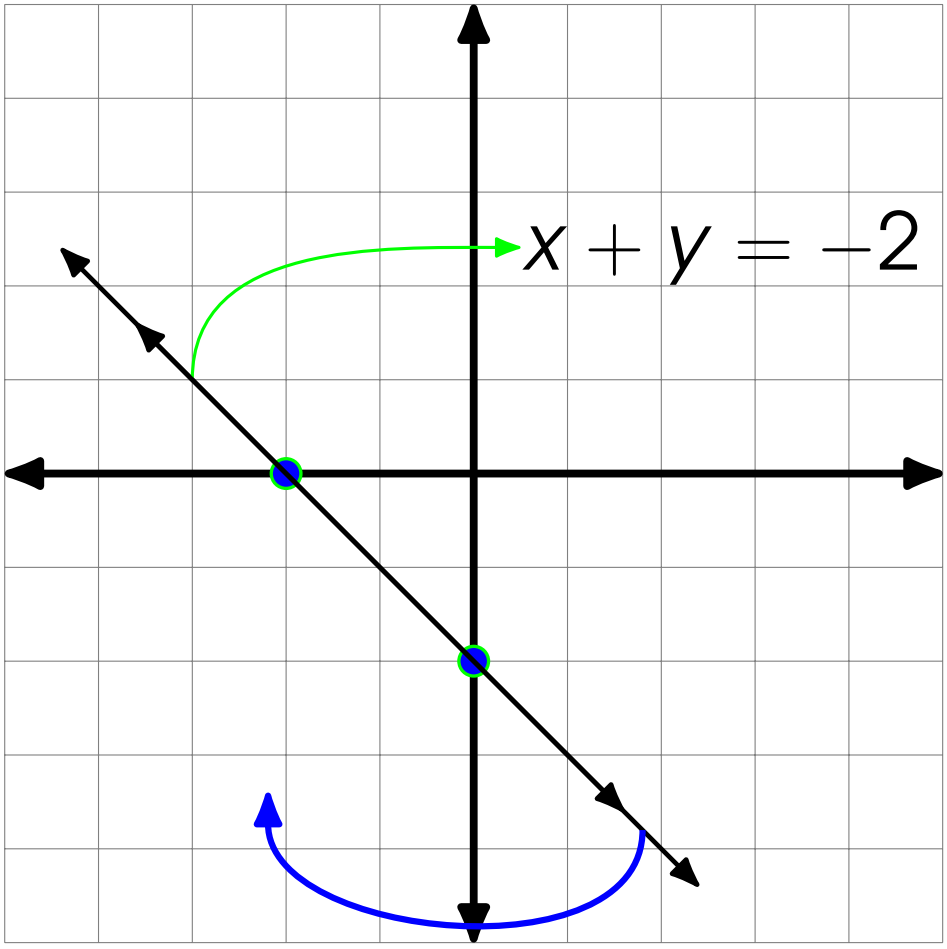

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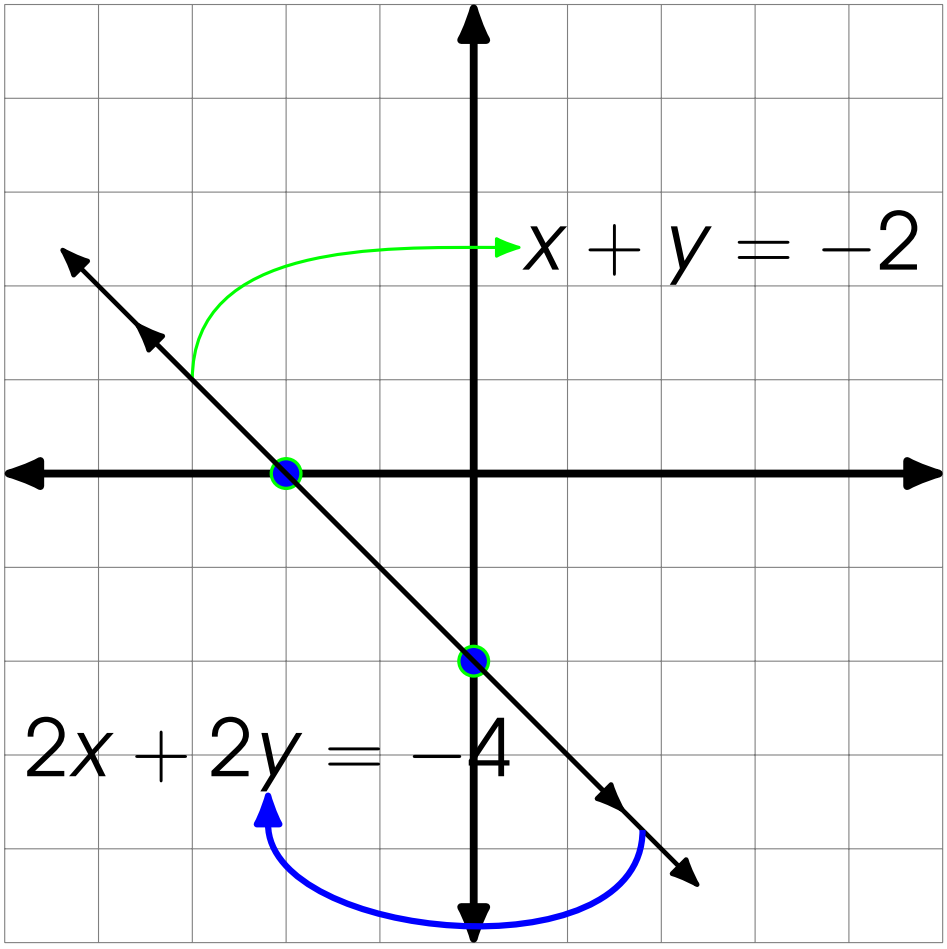

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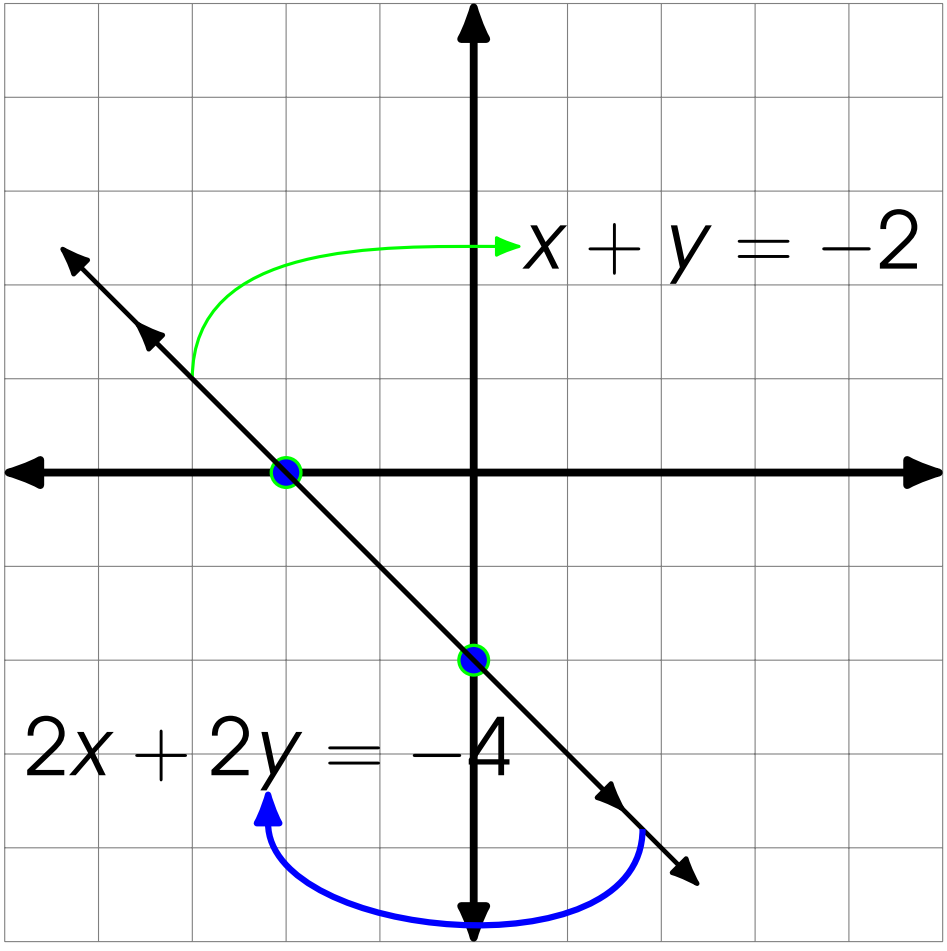

- Graph: coinciding

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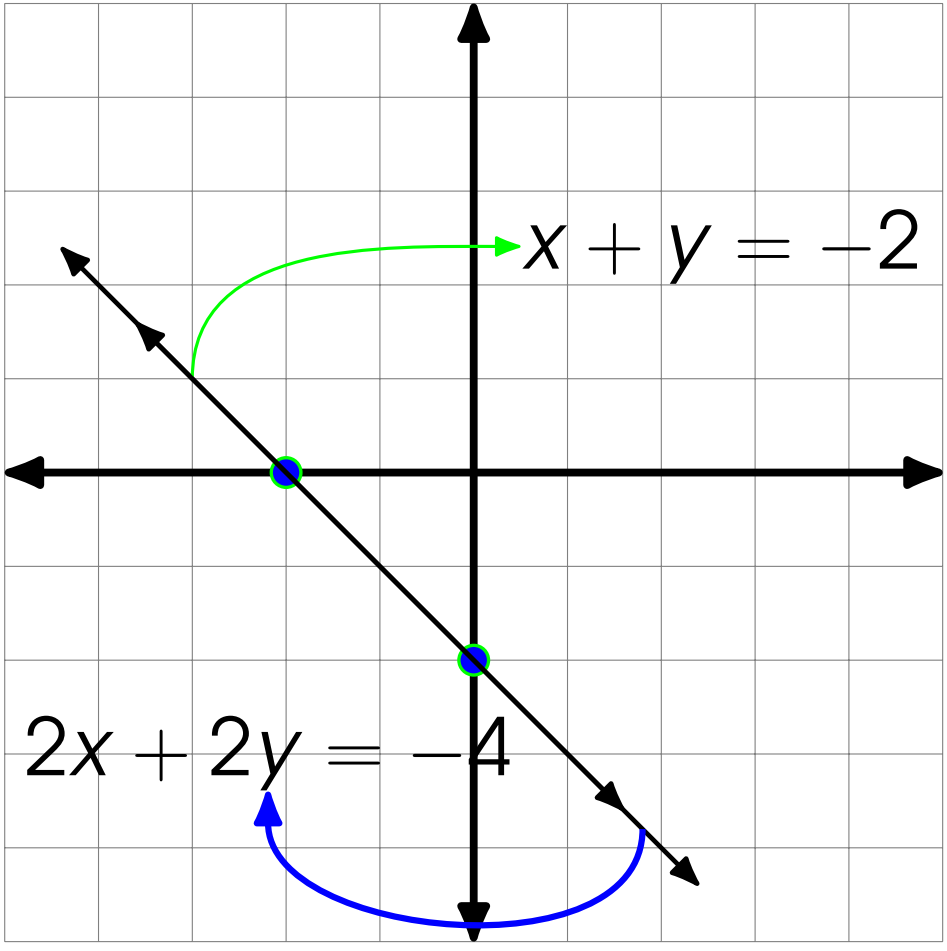

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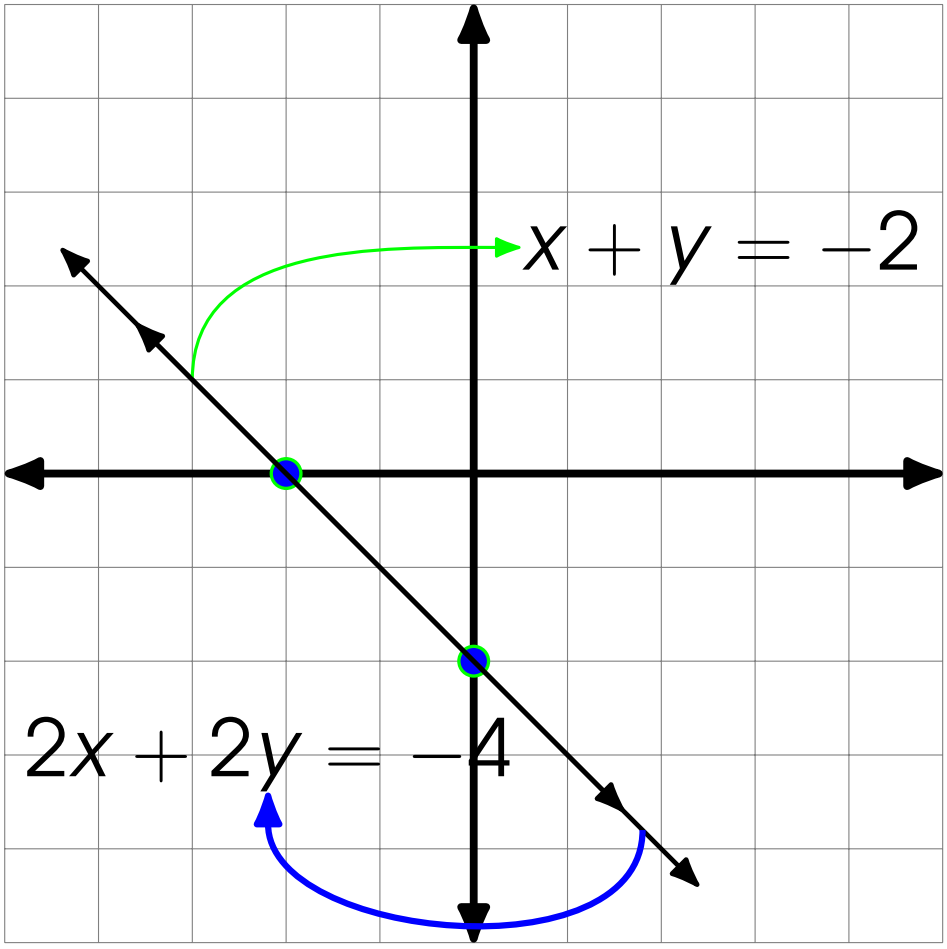

- Graph: coinciding
- Solutions: infinitely many
- Kind: Consistent-dependent

Example 2

Graph, identify the kind of system, and describe the graph of the following system of linear equations:

$$\begin{cases} x + y = -2 \\ x + y = 3 \end{cases}$$

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Step 1: Identify the x-intercept and y-intercept of each equation in the system.

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First equation

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Step 1: Identify the x-intercept and y-intercept of each equation in the system.

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Find the x-intercept:

Let $y = 0$ $x + 0 = -2$

Simplify

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Second equation

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Second equation $x + y = 3$

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Let $x = 0$	$0 + y = 3$

Example 2

Step 1: Identify the x-intercept and y-intercept of each equation in the system.

Second equation	$\boldsymbol{x + y = 3}$
Find the x-intercept:	
Let $y = 0$	$x + 0 = 3$
Simplify	$x = 3$
Coordinates	$(3, 0)$
Find the y-intercept:	
Let $x = 0$	$0 + y = 3$
Simplify	

Example 2

Step 1: Identify the x-intercept and y-intercept of each equation in the system.

Second equation	$\boldsymbol{x + y = 3}$
Find the x-intercept:	
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Simplify	$x = 3$
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Example 2

Step 2: Plot the intercepts of both equations on the same Cartesian plane.

Plot:

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Plot:

- $(-2, 0)$ and $(0, -2)$ for $x + y = -2$

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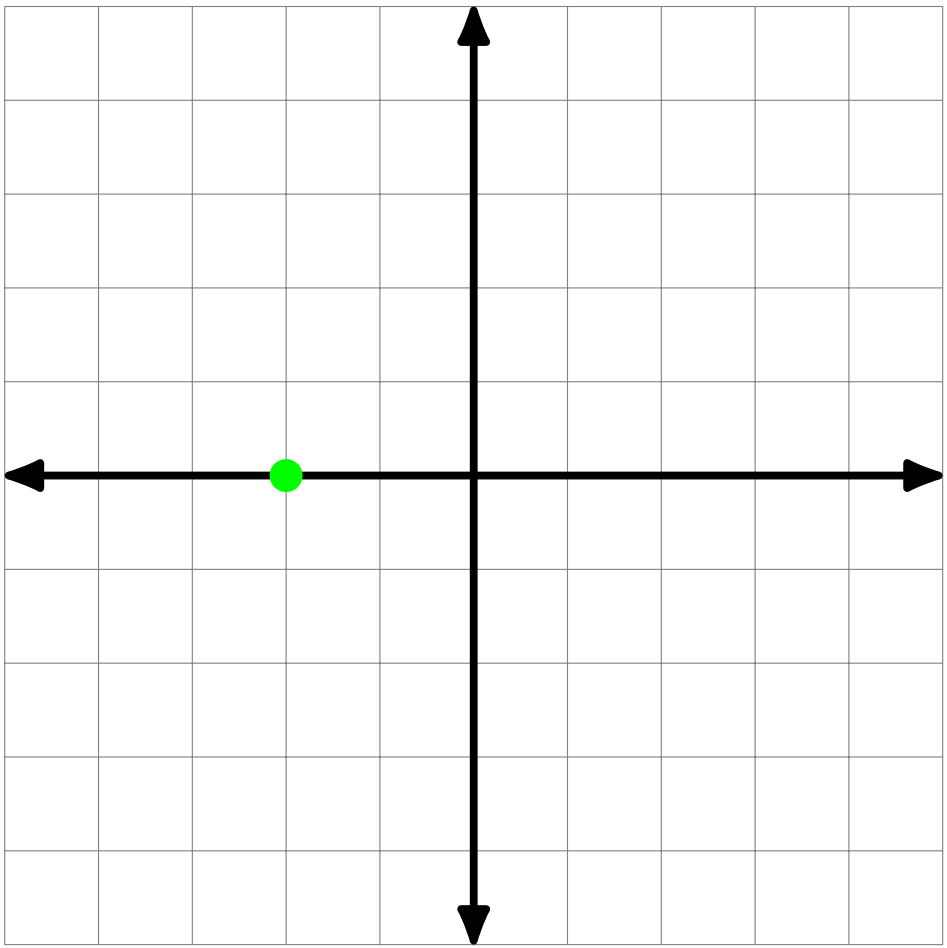

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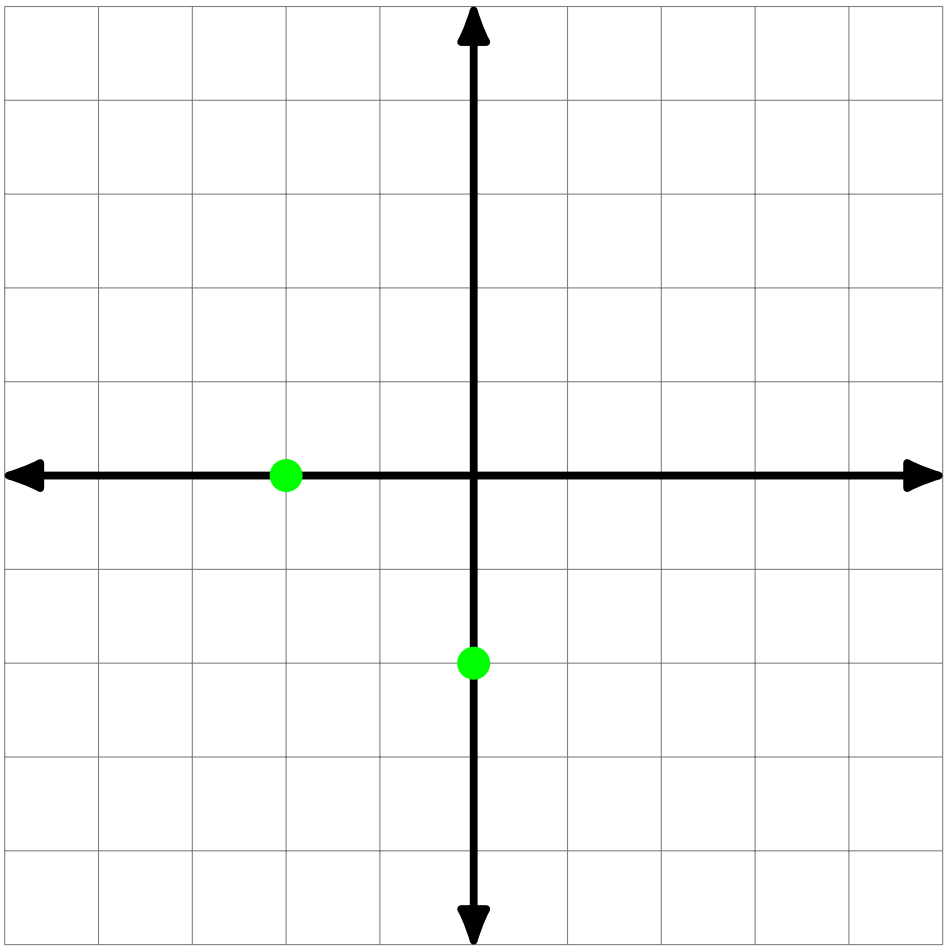

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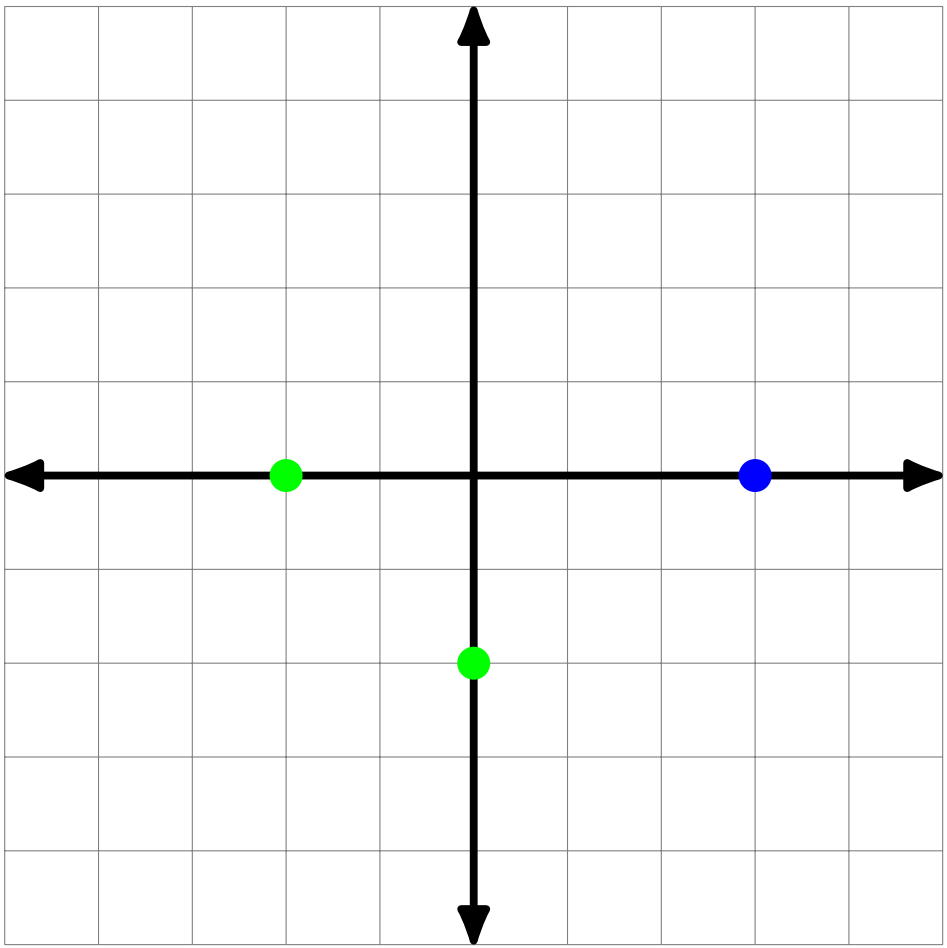

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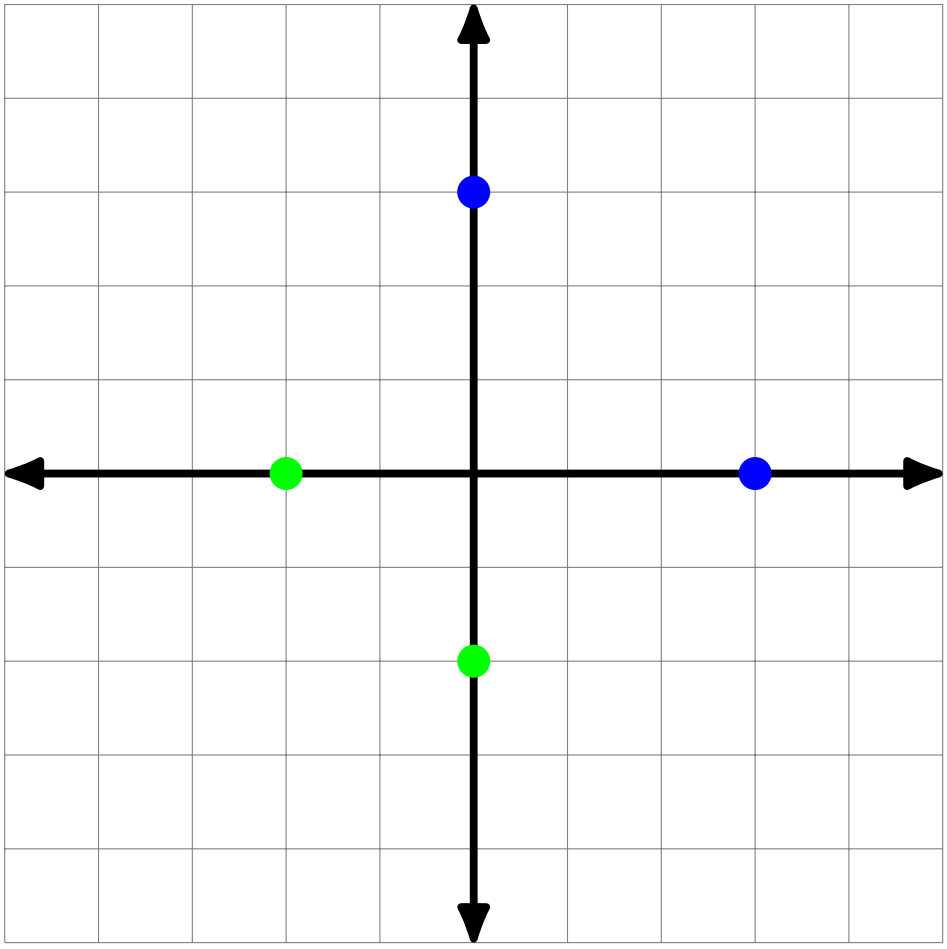

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Step 3: Connect the x-intercept and y-intercept.

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- $(-2, 0)$ and $(0, -2)$ for $x + y = -2$
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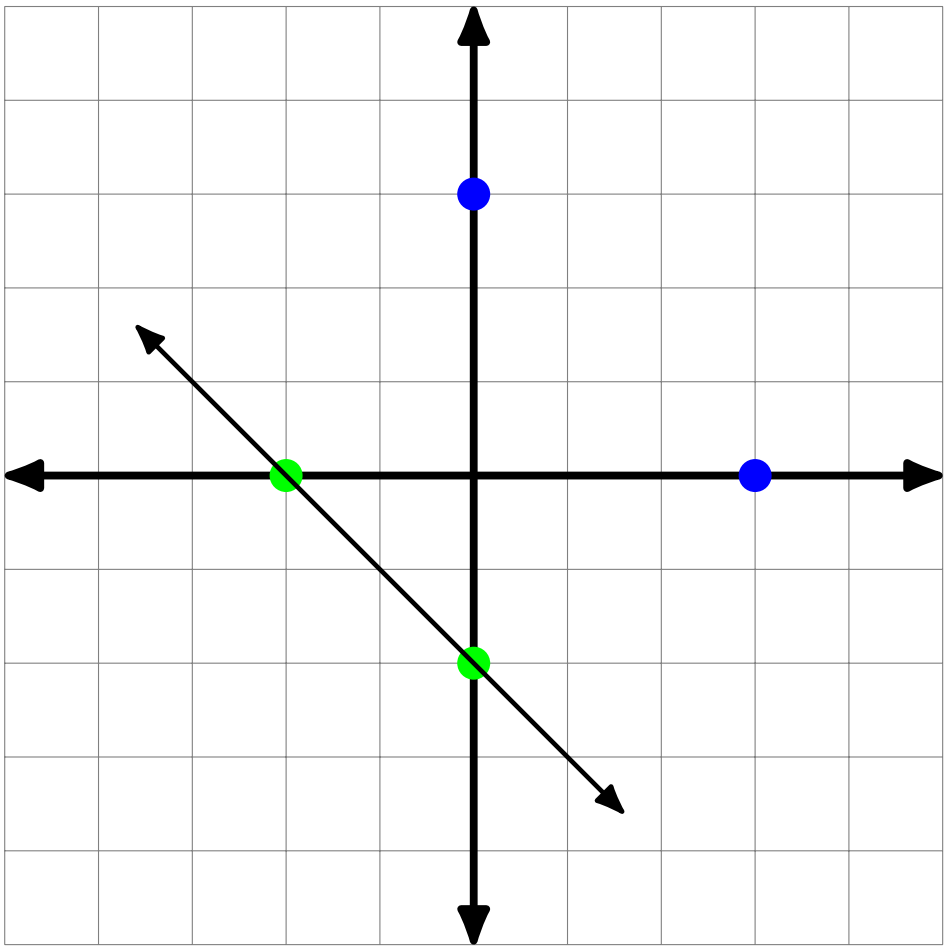

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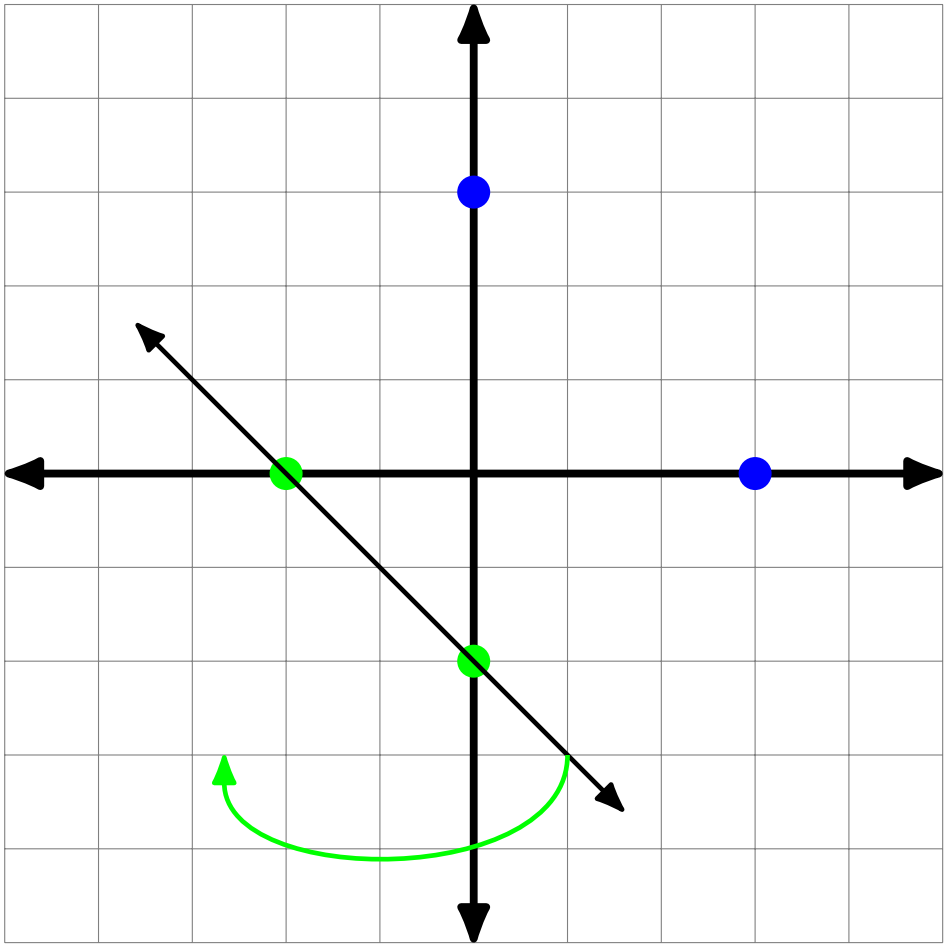

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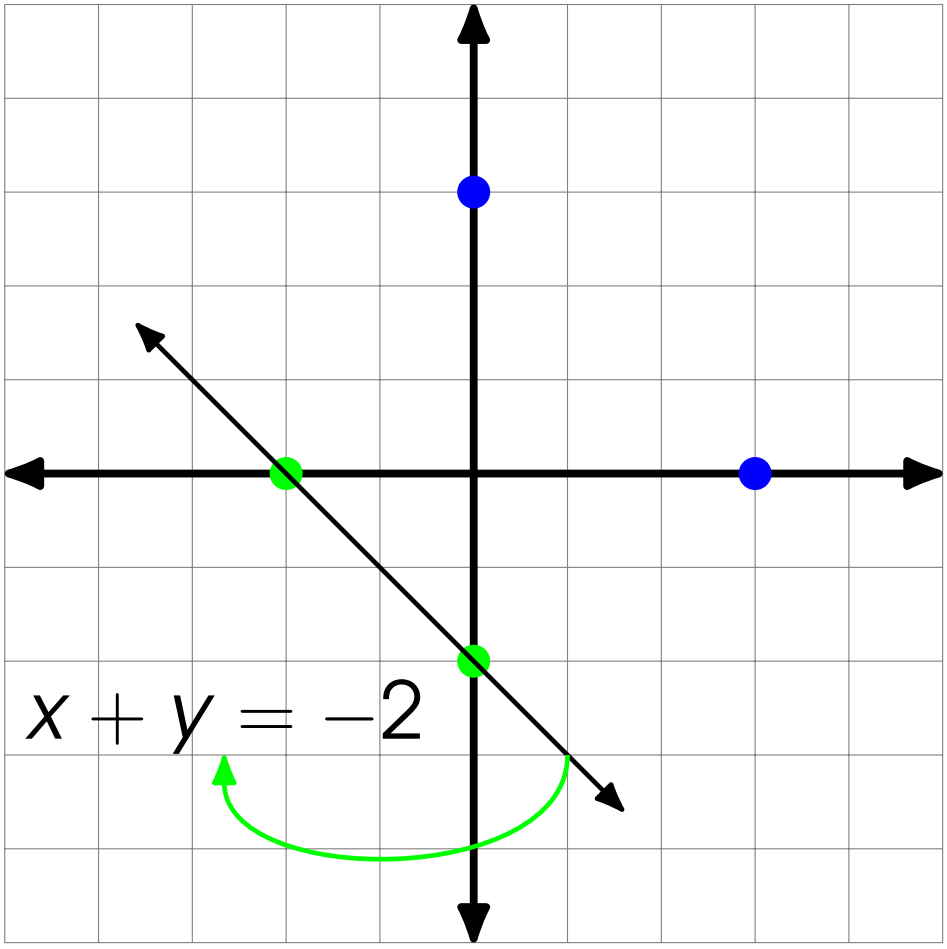

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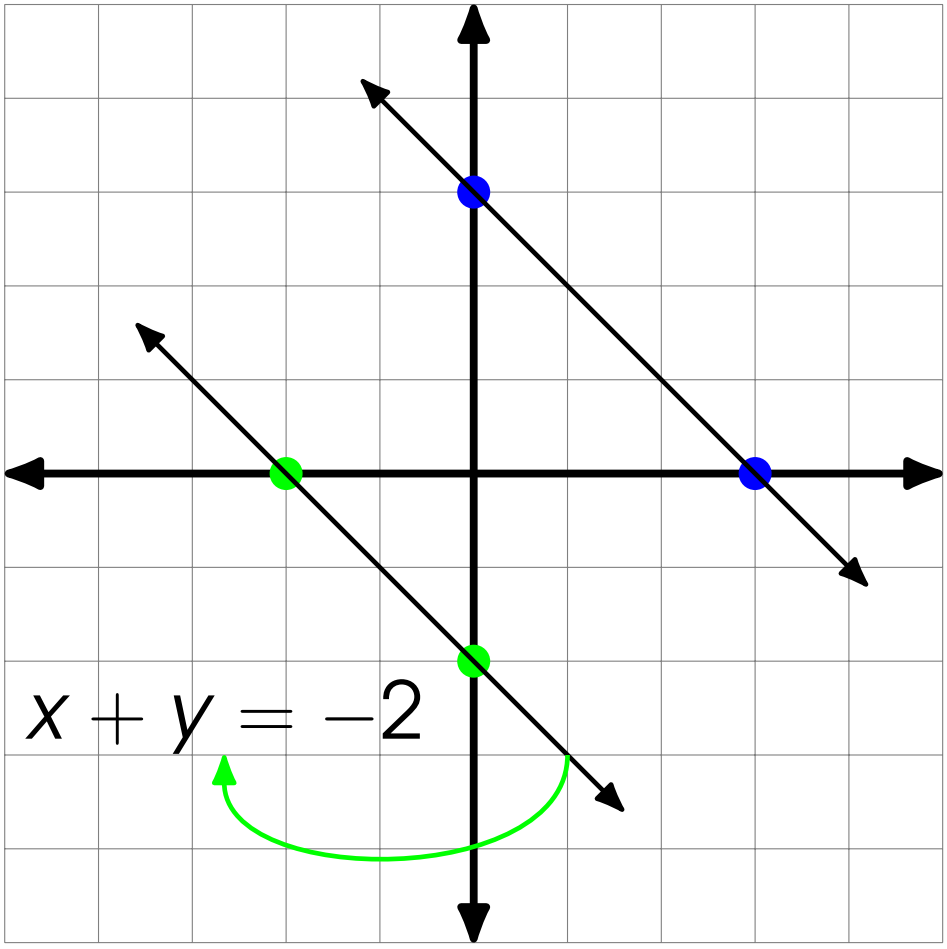

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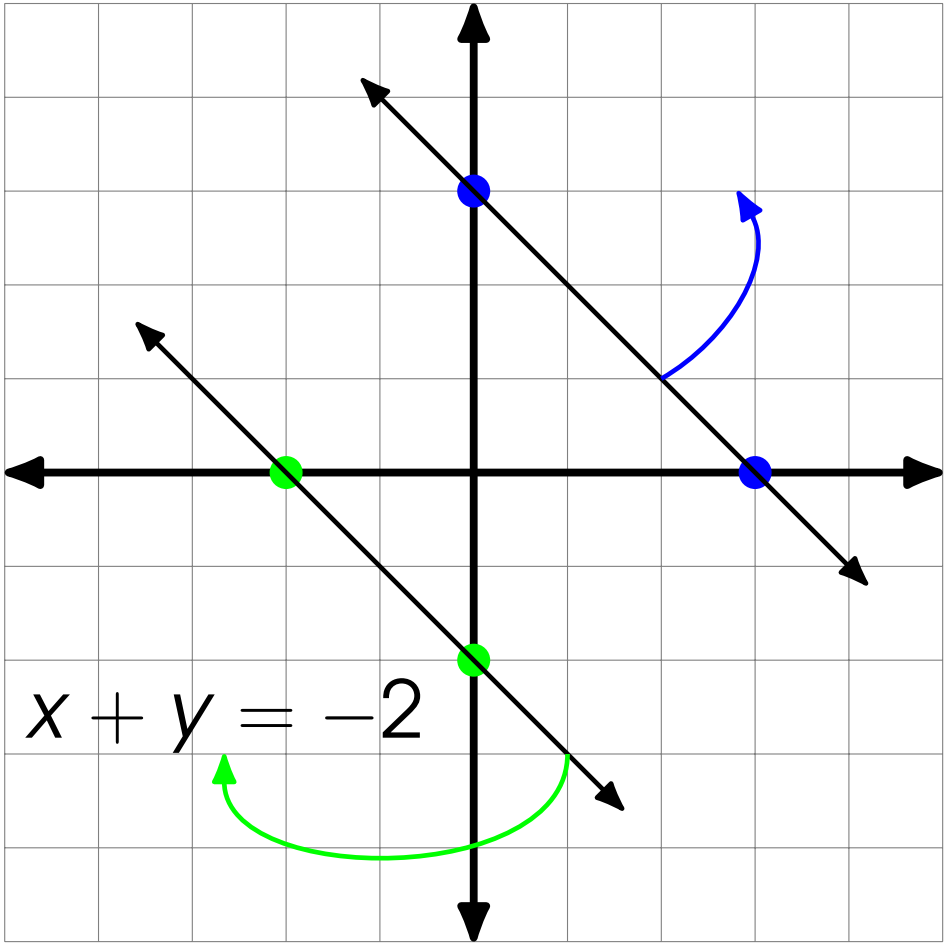

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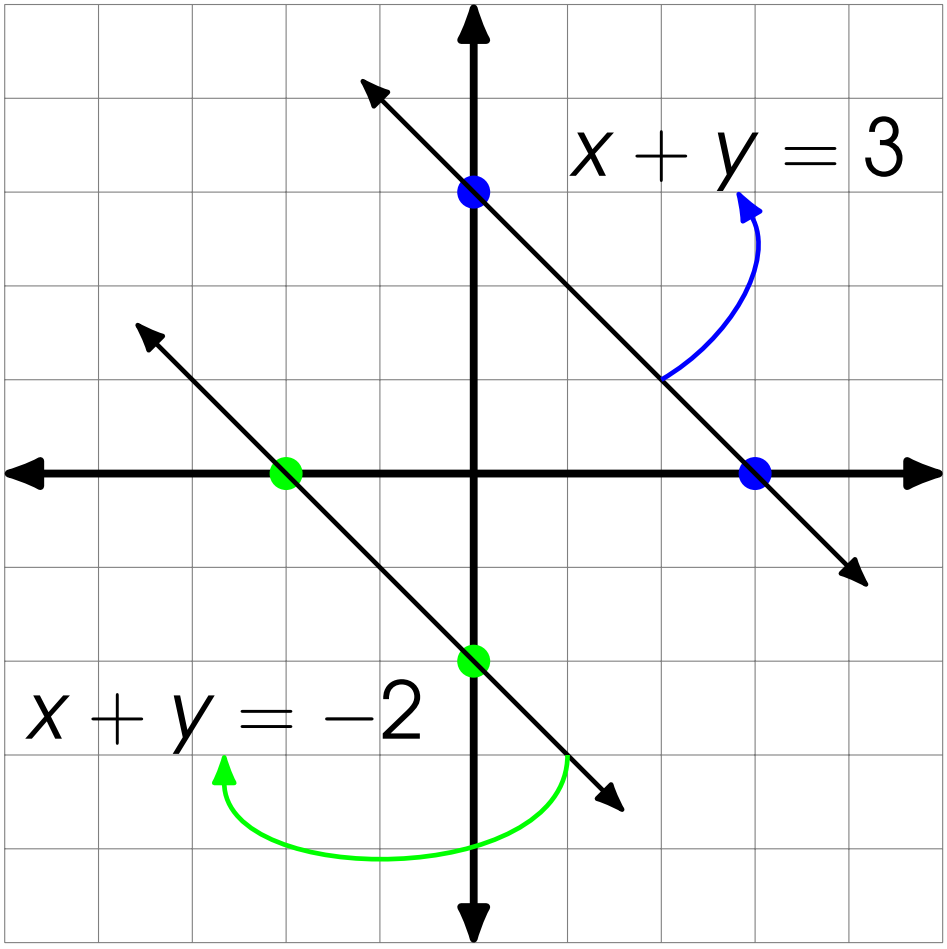

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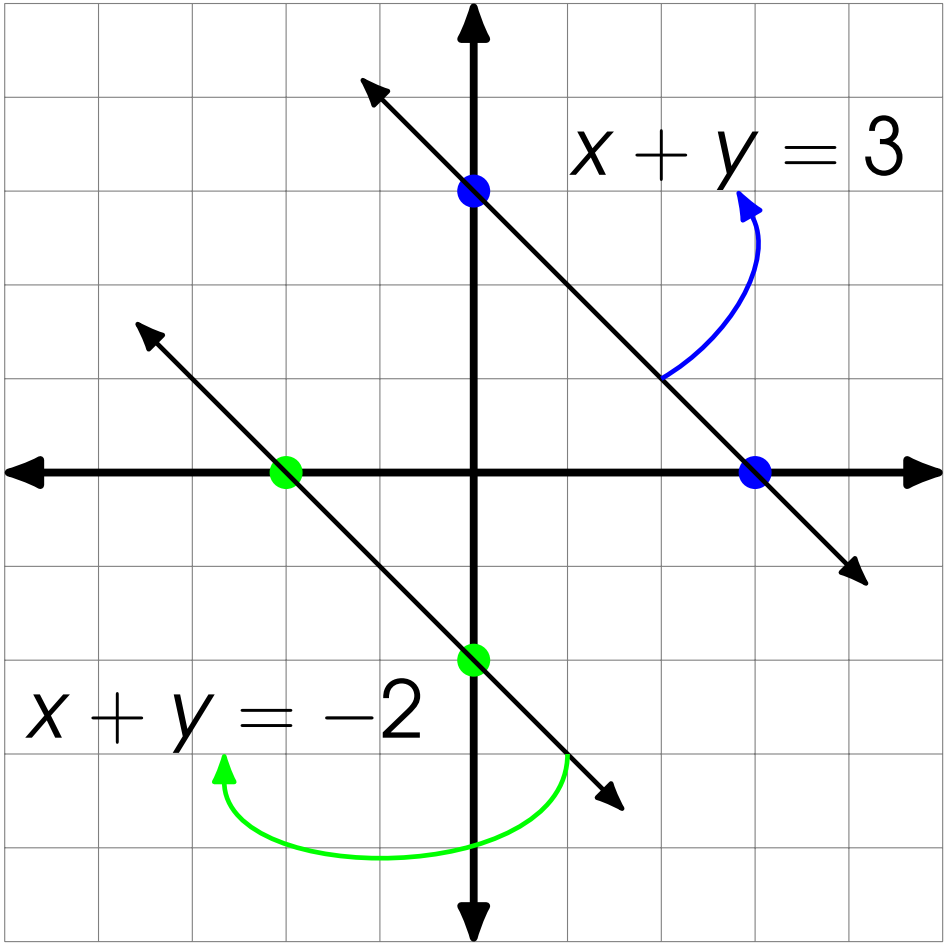

- Graph: parallel

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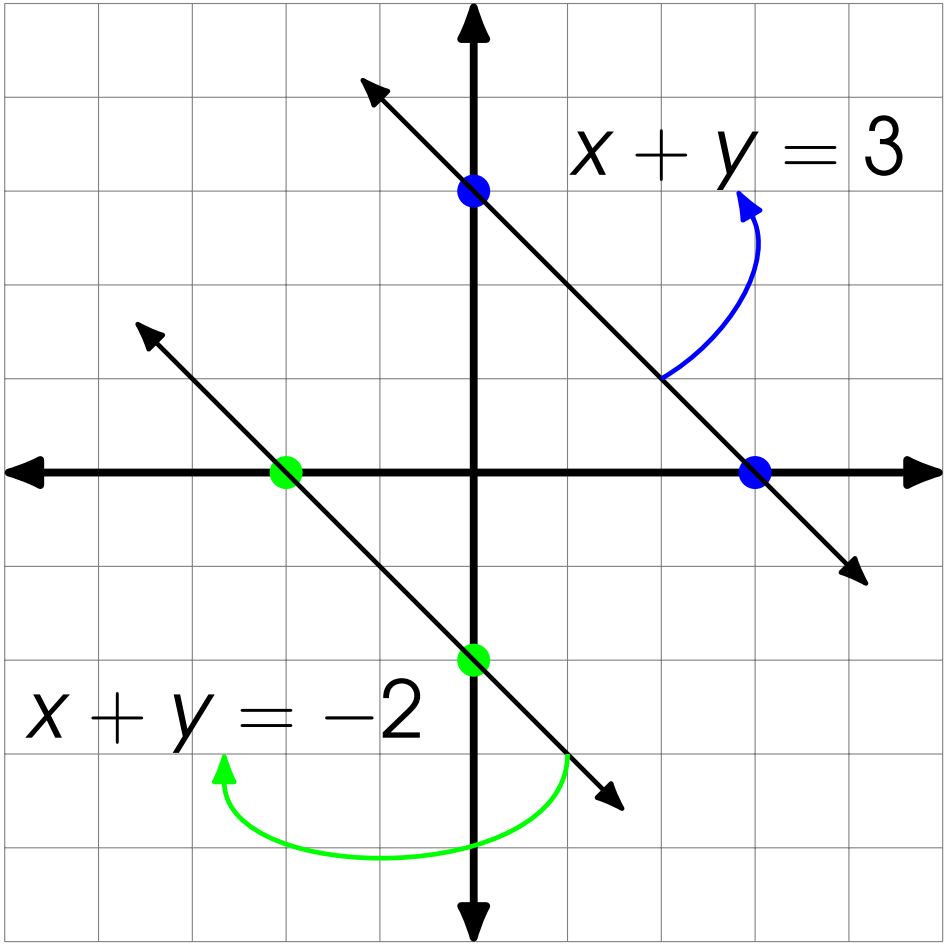

- Graph: parallel
- Solutions: none

Example 2

Step 3: Connect the x-intercept and y-intercept.

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- $(-2, 0)$ and $(0, -2)$ for $x + y = -2$
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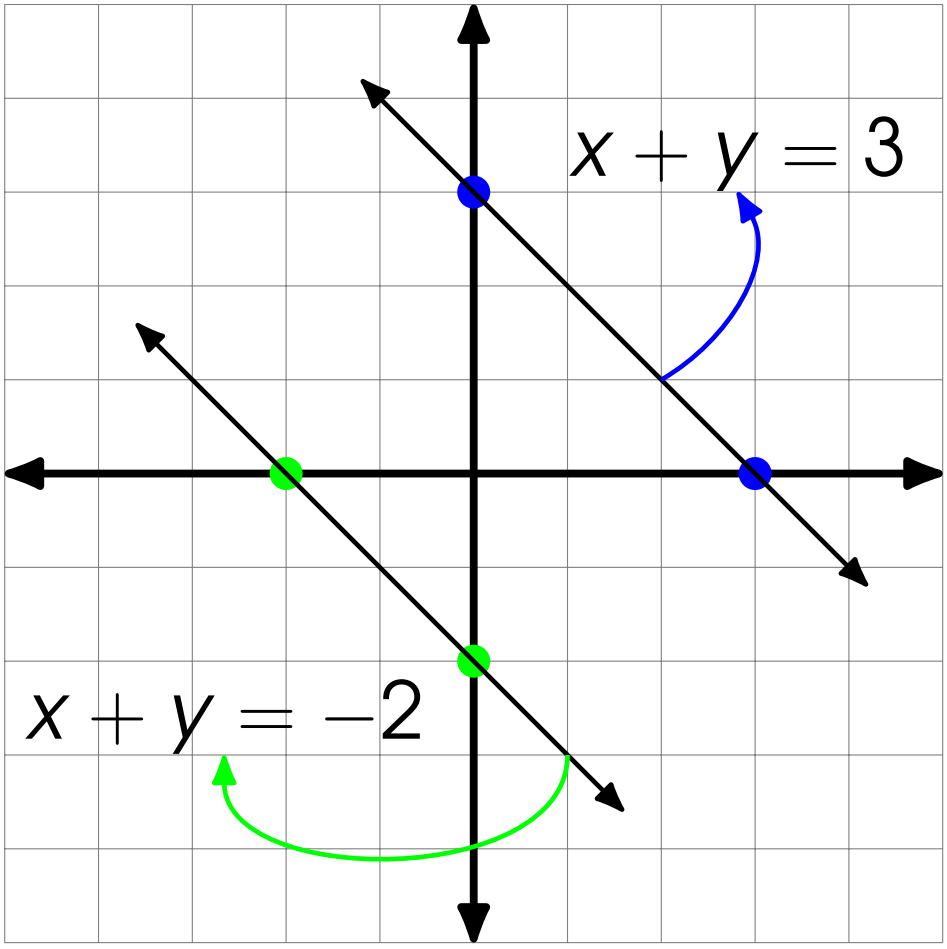

- Graph: parallel
- Solutions: none
- Kind: Inconsistent

Example 3

Graph, identify the kind of system, and describe the graph of the following system of linear equations:

$$\begin{cases} x + y = 4 \\ x - y = 2 \end{cases}$$

Example 3

Step 1: Identify the x-intercept and y-intercept of each equation in the system.

Example 3

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First equation

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First equation $x + y = 4$

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First equation $x + y = 4$

Find the x-intercept:

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Step 1: Identify the x-intercept and y-intercept of each equation in the system.

First equation $\boldsymbol{x + y = 4}$

Find the x-intercept:

Let $y = 0$

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First equation $\boldsymbol{x + y = 4}$

Find the x-intercept:

Let $y = 0$ $x + 0 = 4$

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Step 1: Identify the x-intercept and y-intercept of each equation in the system.

First equation $\boldsymbol{x + y = 4}$

Find the x-intercept:

Let $y = 0$ $x + 0 = 4$

Simplify

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Step 1: Identify the x-intercept and y-intercept of each equation in the system.

First equation	$\boldsymbol{x + y = 4}$
Find the x-intercept:	
Let $y = 0$	$x + 0 = 4$
Simplify	$x = 4$

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First equation	$\boldsymbol{x + y = 4}$
Find the x-intercept:	
Let $y = 0$	$x + 0 = 4$
Simplify	$x = 4$
Coordinates	

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First equation	$\boldsymbol{x + y = 4}$
Find the x-intercept:	
Let $y = 0$	$x + 0 = 4$
Simplify	$x = 4$
Coordinates	$(4, 0)$

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First equation	$\boldsymbol{x + y = 4}$
Find the x-intercept:	
Let $y = 0$	$x + 0 = 4$
Simplify	$x = 4$
Coordinates	$(4, 0)$
Find the y-intercept:	

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First equation	$\boldsymbol{x + y = 4}$
Find the x-intercept:	
Let $y = 0$	$x + 0 = 4$
Simplify	$x = 4$
Coordinates	$(4, 0)$
Find the y-intercept:	
Let $x = 0$	

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Simplify	$x = 4$
Coordinates	$(4, 0)$
Find the y-intercept:	
Let $x = 0$	$0 + y = 4$

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Simplify	$x = 4$
Coordinates	$(4, 0)$
Find the y-intercept:	
Let $x = 0$	$0 + y = 4$
Simplify	

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Let $x = 0$	$0 + y = 4$
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Simplify	$y = 4$
Coordinates	

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Coordinates	$(4, 0)$
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Coordinates	$(0, 4)$

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Second equation

Example 3

Step 1: Identify the x-intercept and y-intercept of each equation in the system.

Second equation $x - y = 2$

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Second equation $\boldsymbol{x - y = 2}$

Find the x-intercept:

Let $y = 0$ $x - 0 = 2$

Example 3

Step 1: Identify the x-intercept and y-intercept of each equation in the system.

Second equation $\boldsymbol{x - y = 2}$

Find the x-intercept:

Let $y = 0$ $x - 0 = 2$

Simplify

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Step 1: Identify the x-intercept and y-intercept of each equation in the system.

Second equation	$\boldsymbol{x - y = 2}$
Find the x-intercept:	
Let $y = 0$	$x - 0 = 2$
Simplify	$x = 2$

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Second equation	$\boldsymbol{x - y = 2}$
Find the x-intercept:	
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Simplify	$x = 2$
Coordinates	

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Second equation	$\boldsymbol{x - y = 2}$
Find the x-intercept:	
Let $y = 0$	$x - 0 = 2$
Simplify	$x = 2$
Coordinates	$(2, 0)$

Example 3

Step 1: Identify the x-intercept and y-intercept of each equation in the system.

Second equation	$\boldsymbol{x - y = 2}$
Find the x-intercept:	
Let $y = 0$	$x - 0 = 2$
Simplify	$x = 2$
Coordinates	$(2, 0)$
Find the y-intercept:	

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Find the y-intercept:	
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Simplify	$-y = 2$

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Coordinates	$(2, 0)$
Find the y-intercept:	
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Simplify	$-y = 2$
Use MPE	

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Coordinates	$(2, 0)$
Find the y-intercept:	
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Simplify	$-y = 2$
Use MPE	$-1(-y) = -1(2)$

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Find the y-intercept:	
Let $x = 0$	$0 - y = 2$
Simplify	$-y = 2$
Use MPE	$-1(-y) = -1(2)$
Use Distributive Property	

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Use Distributive Property	$y = -2$

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Example 3

Step 2: Plot the intercepts of both equations on the same Cartesian plane.

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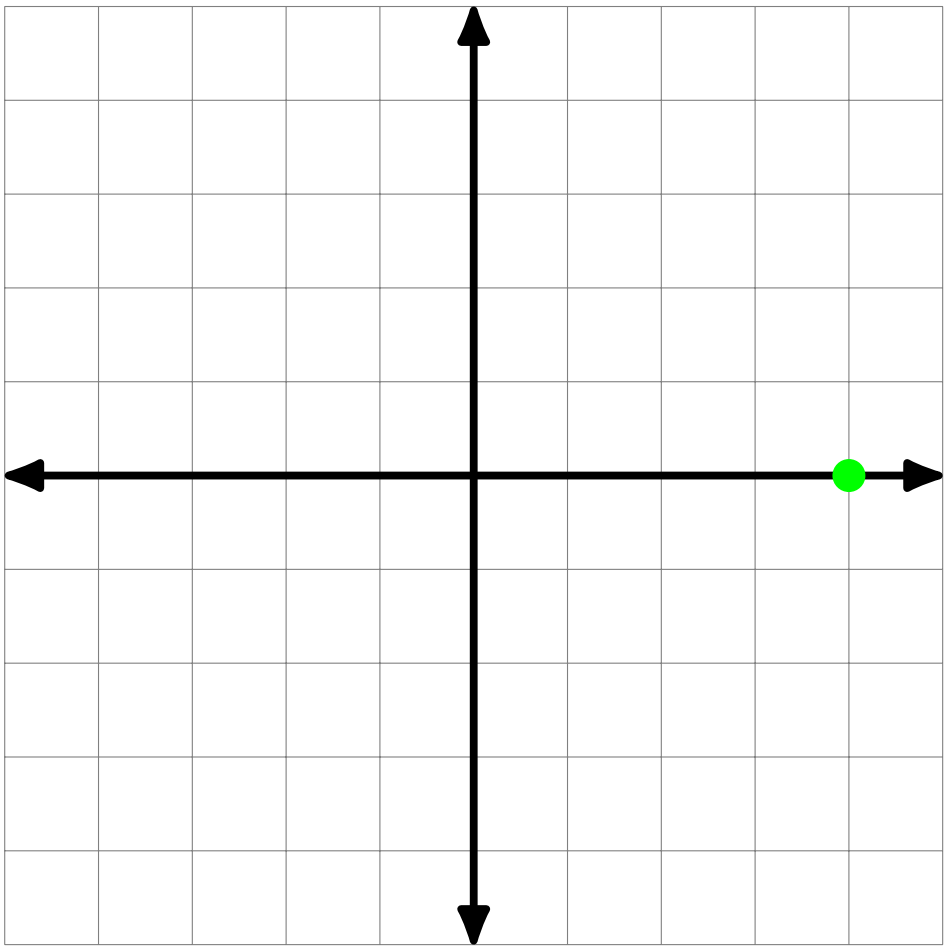

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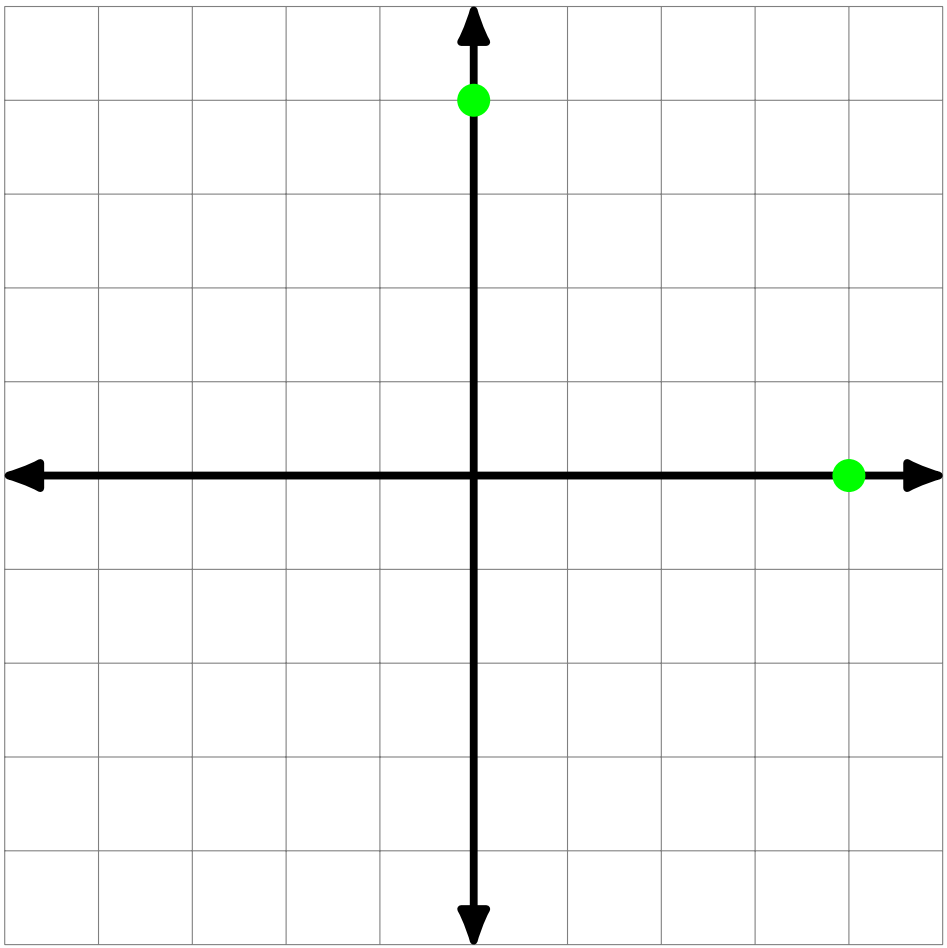

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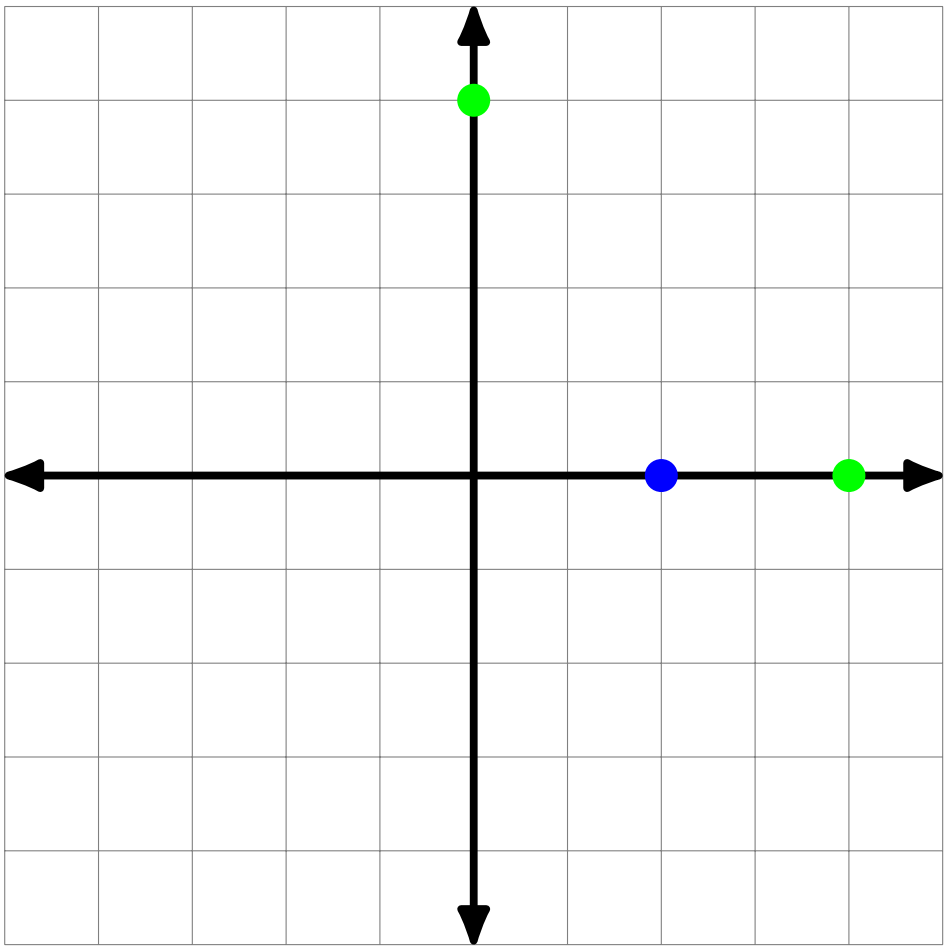

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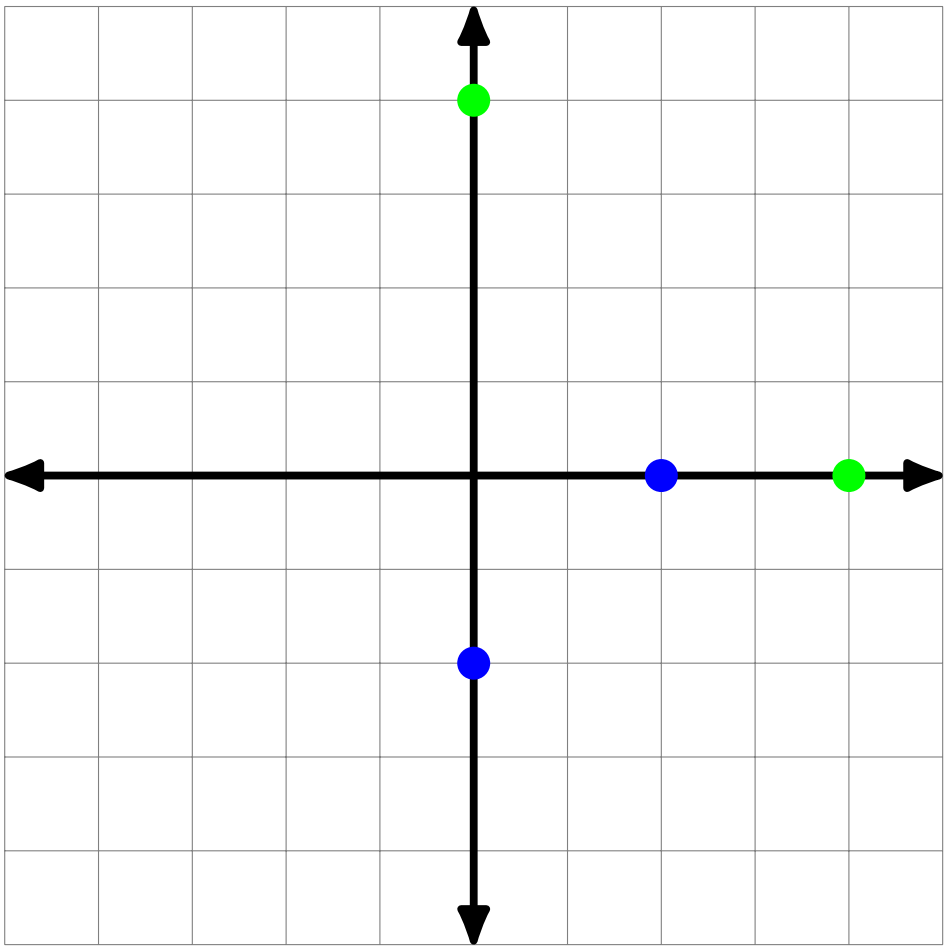

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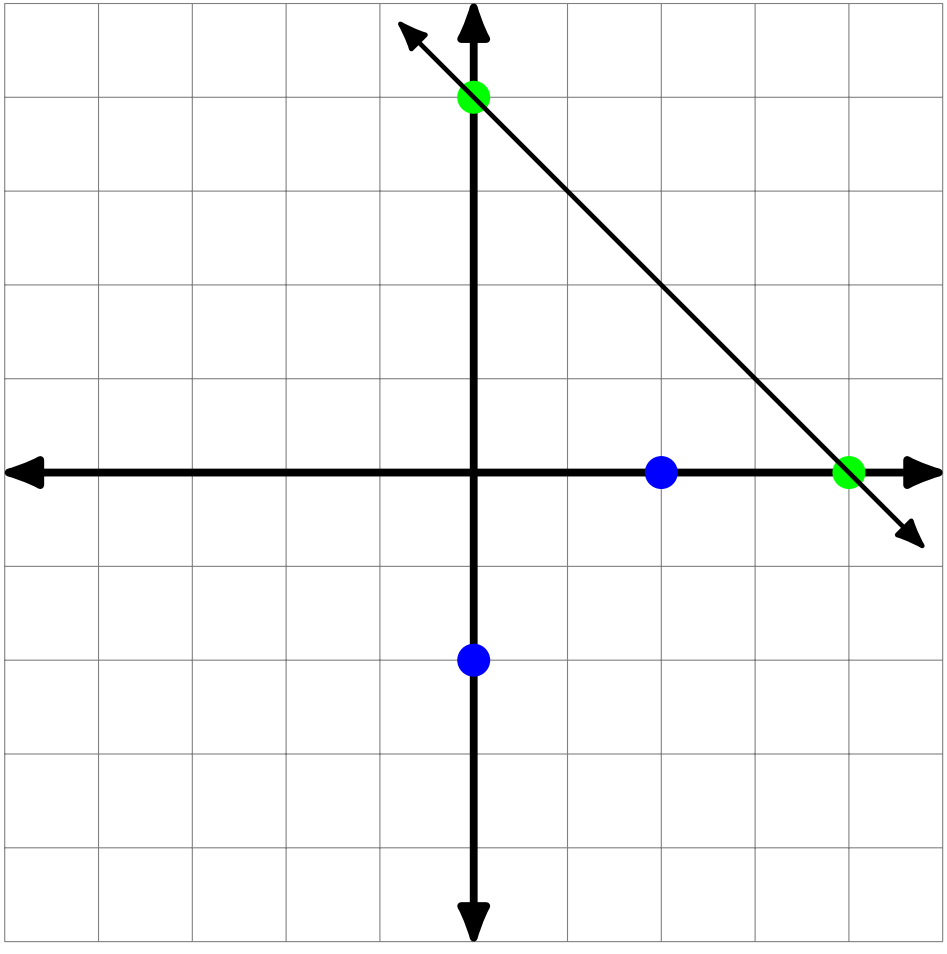

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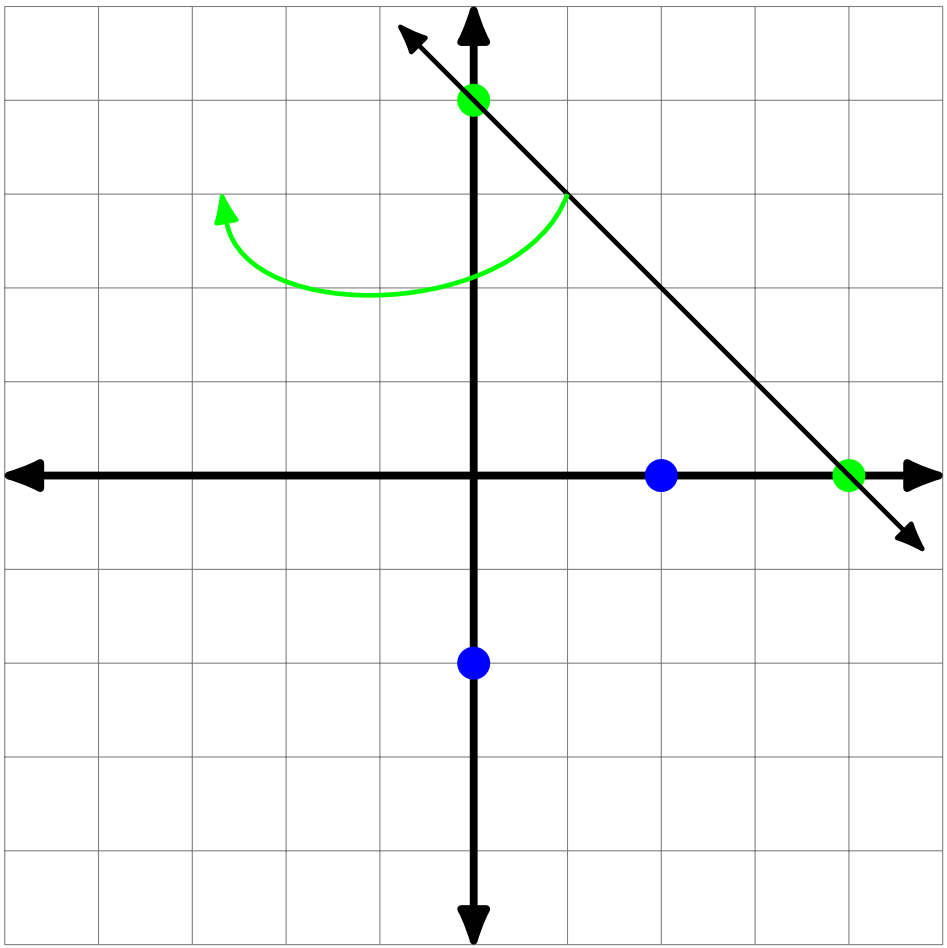
Step 3: Connect the x-intercept and y-intercept.

Plot:

- $(4, 0)$ and $(0, 4)$ for $x + y = 4$
- $(2, 0)$ and $(0, -2)$ for $x - y = 2$



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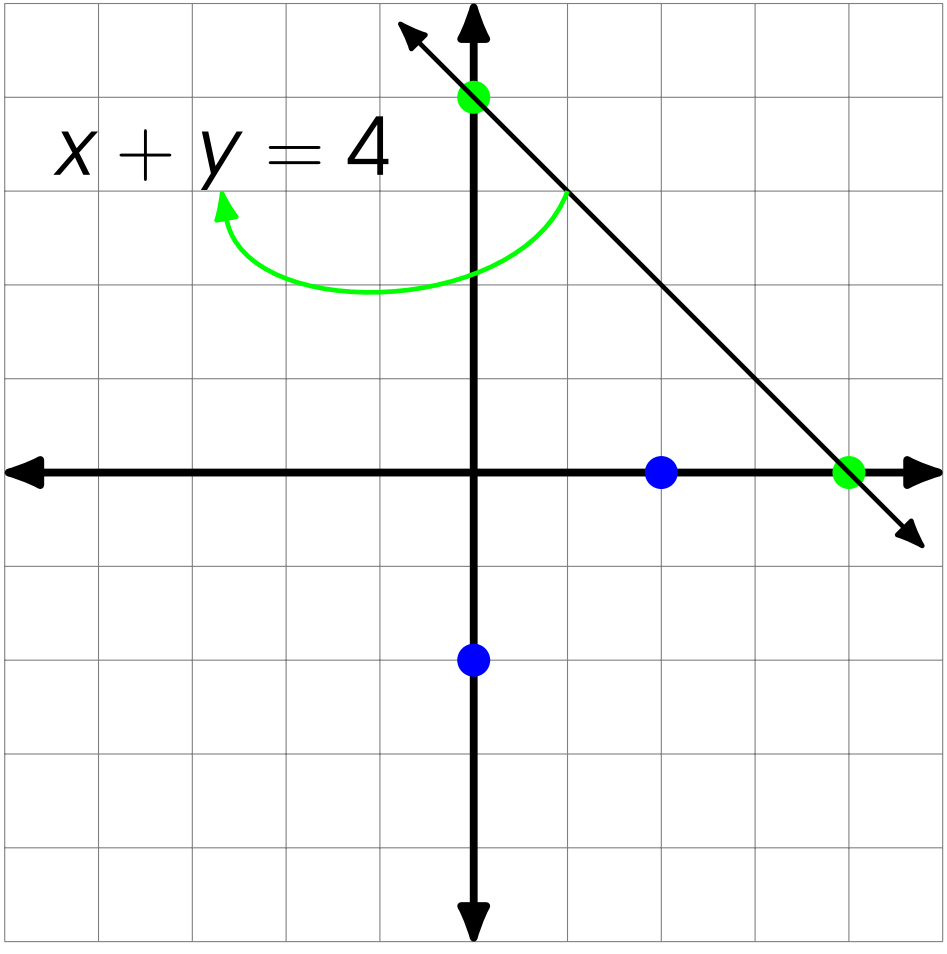

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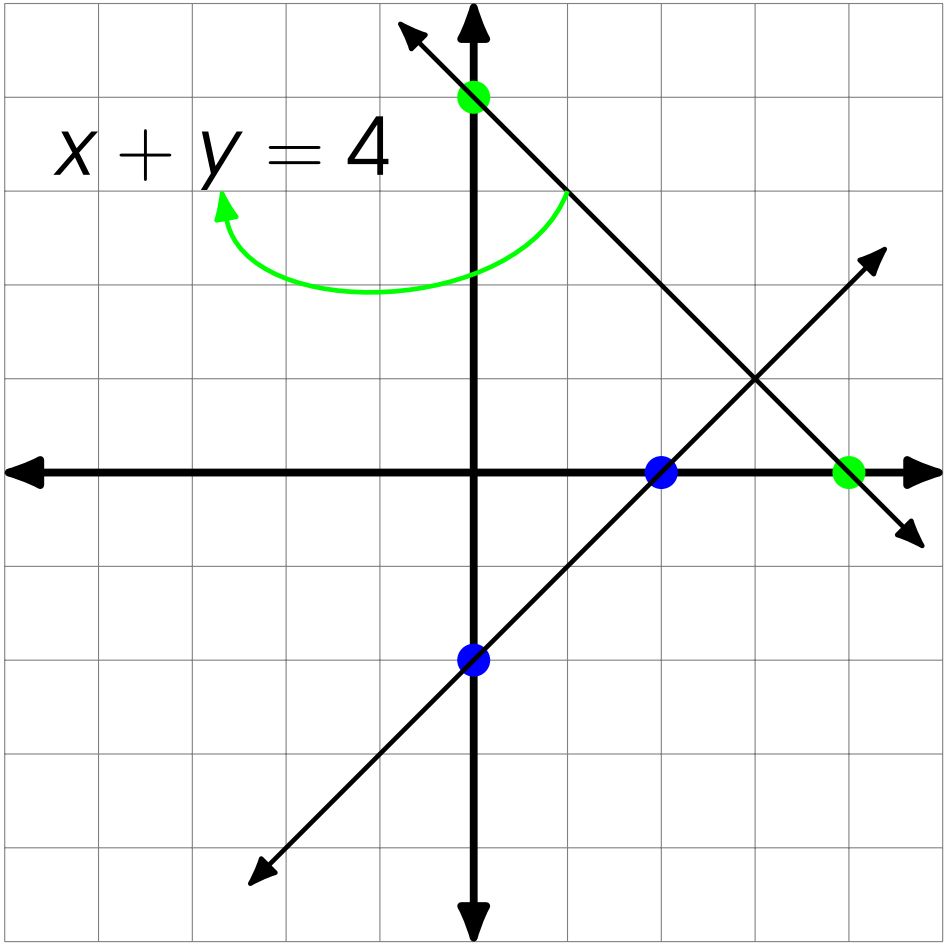

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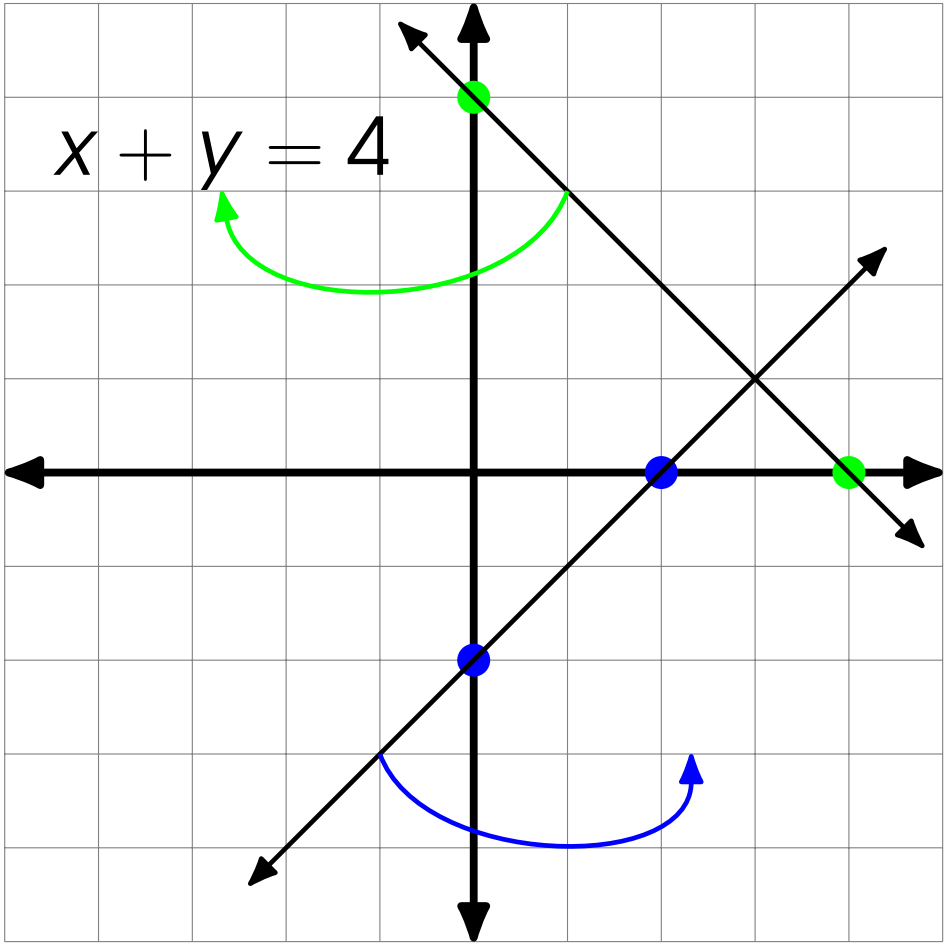

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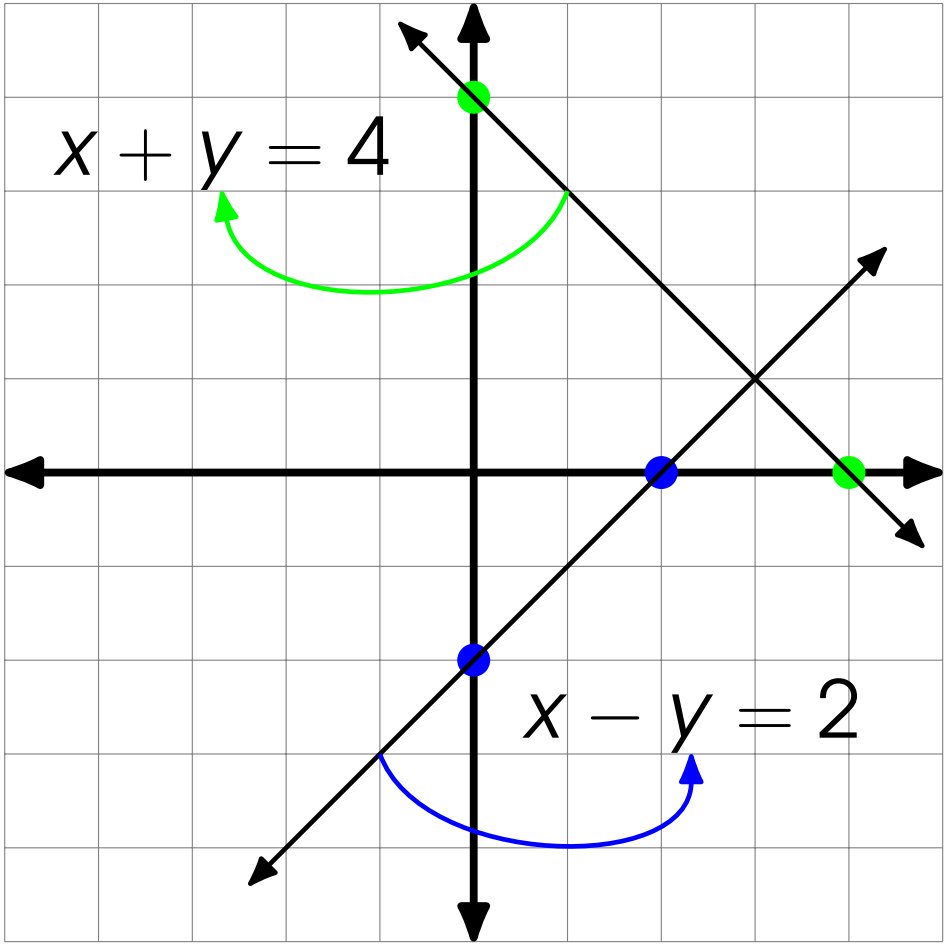

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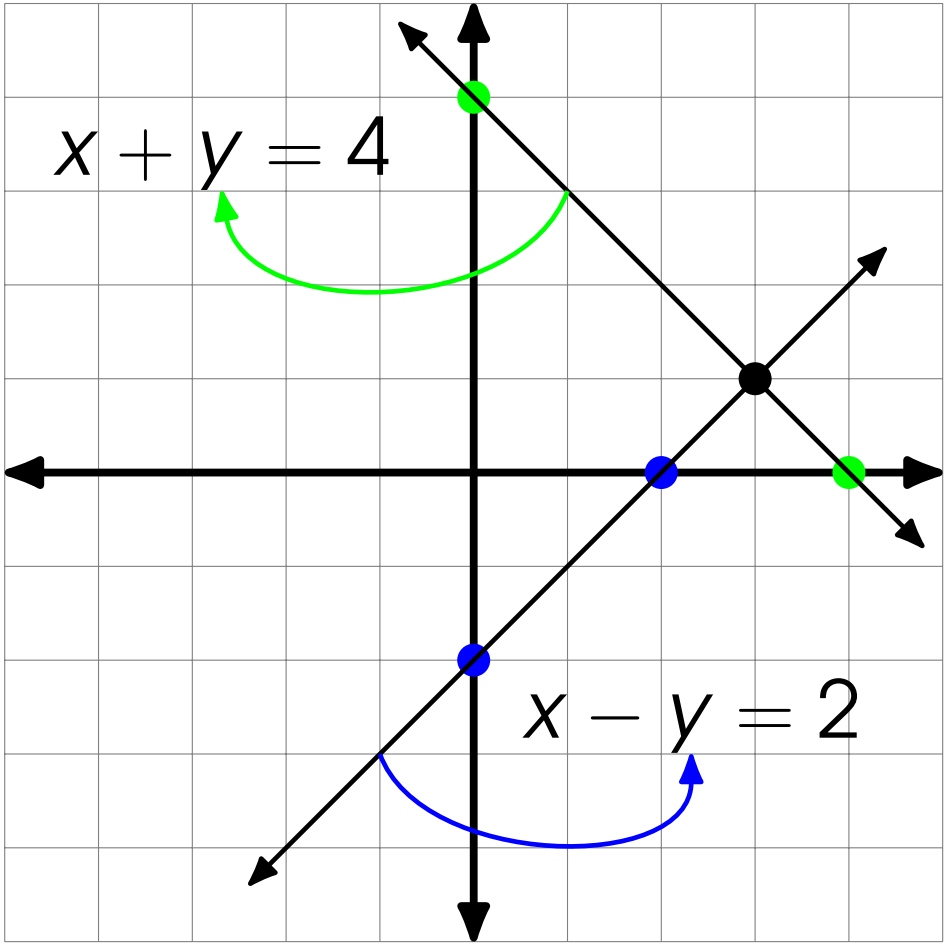

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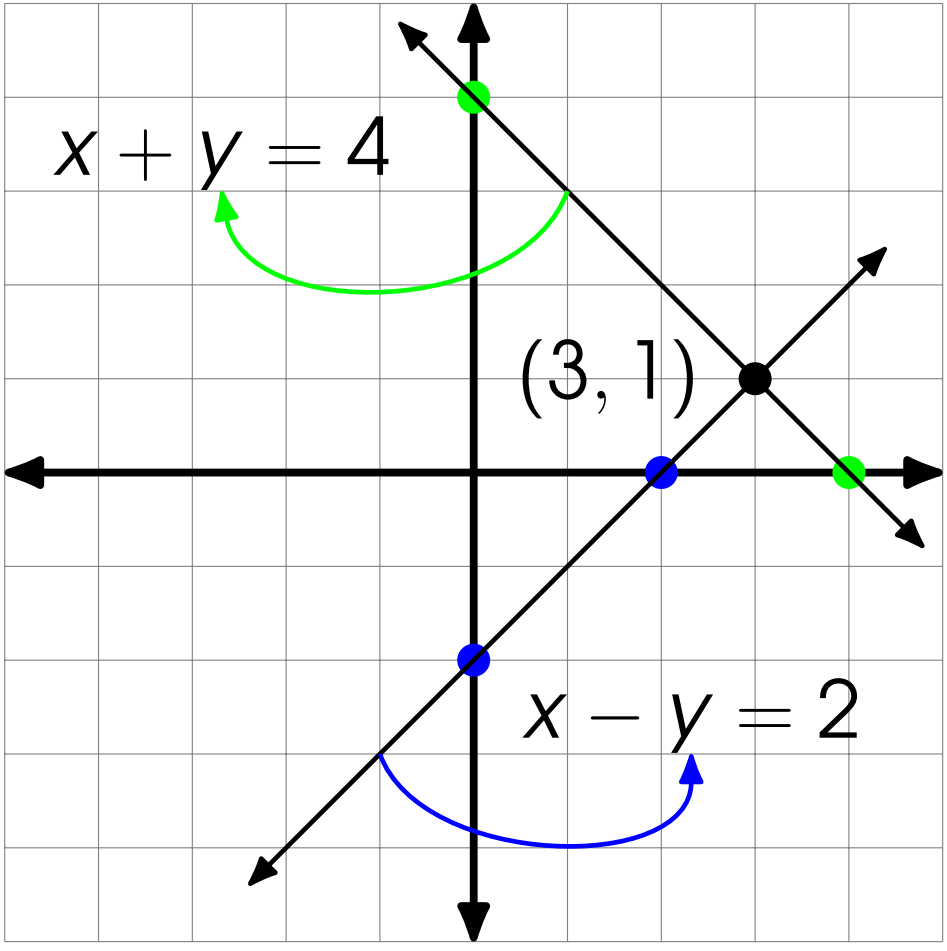

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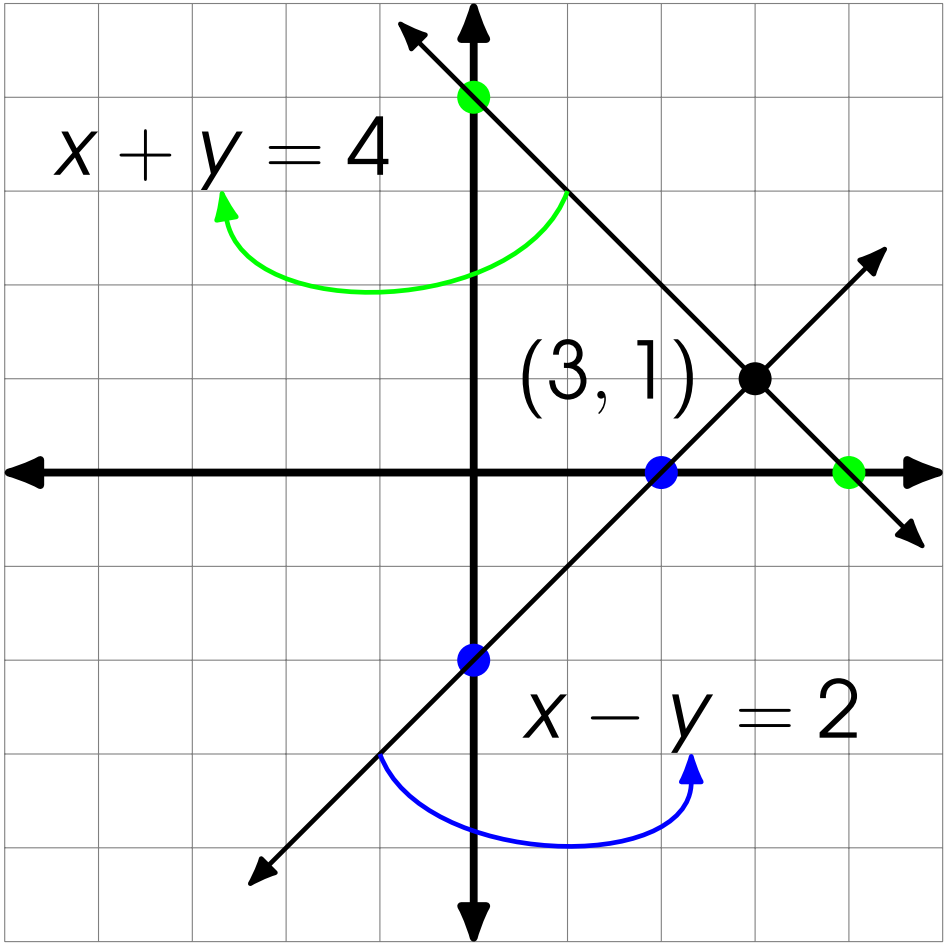

- Graph: intersecting

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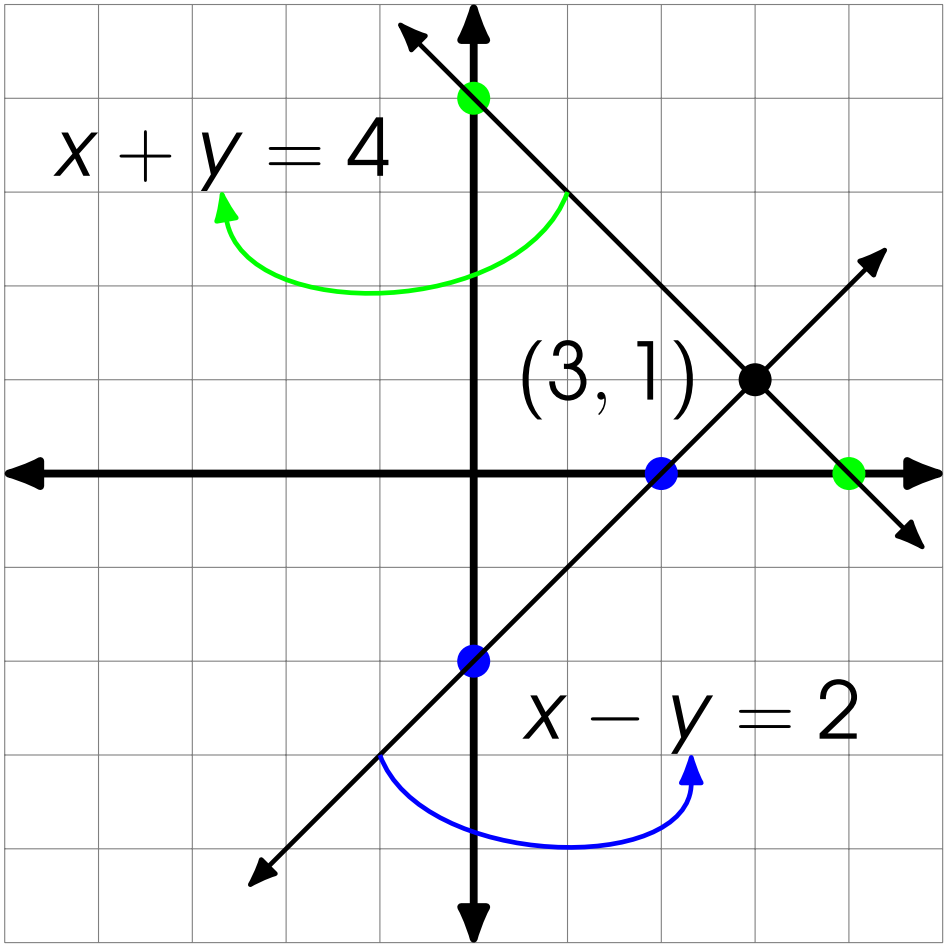

- Graph: intersecting
- Solution: one

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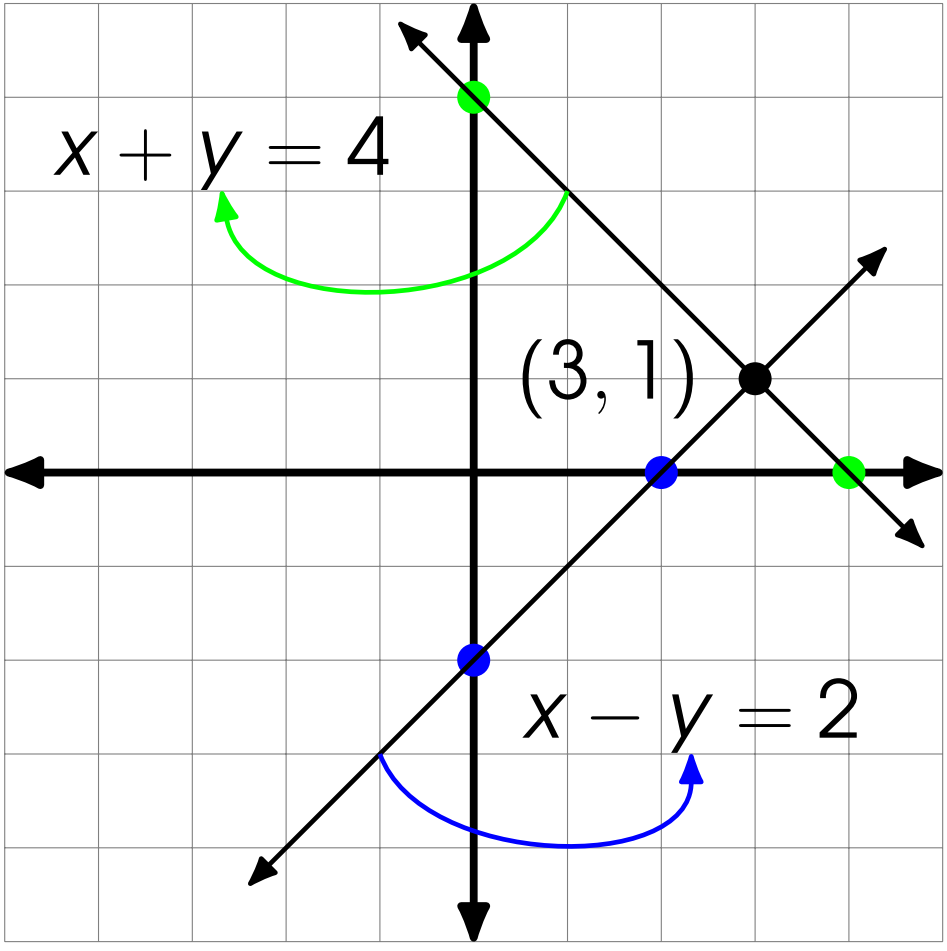

- Graph: intersecting
- Solution: one
- Kind: Consistent-independent

Thank you for watching.