4.1 Solving Systems of Linear Equations by Graphing

Definition 4.1.1 (System of Equations)

- a group of two or more equations that are solved at the same time
- the solution is a point where both equations intersect
- the solution satisfies both equations

Example 4.1.1
Determine which of the points below are a solution to the system:

$$\begin{cases} 2x - 3y = -4 \\ 2x + y = 4 \end{cases}$$

1. $(1, 2)$
2. $(7, 6)$

Methods for Solving Systems of Equations

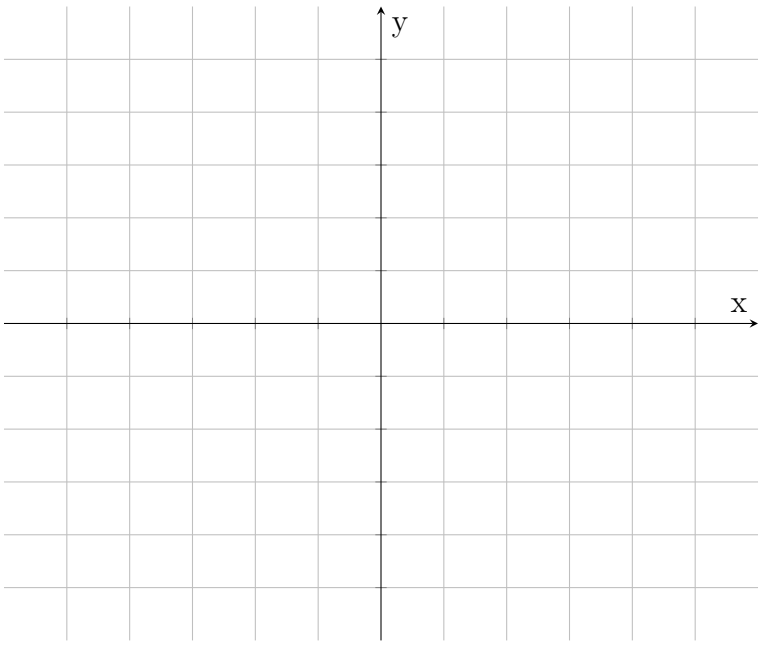
1. Graphing
2. Substitution
3. Elimination/Addition
4. CAS (Computer Algebra Software)

Method: Graphing

1. Graph both equations on the same plane.
2. Determine if and where the lines intersect.
3. Algebraically verify whether the point is a solution or not.

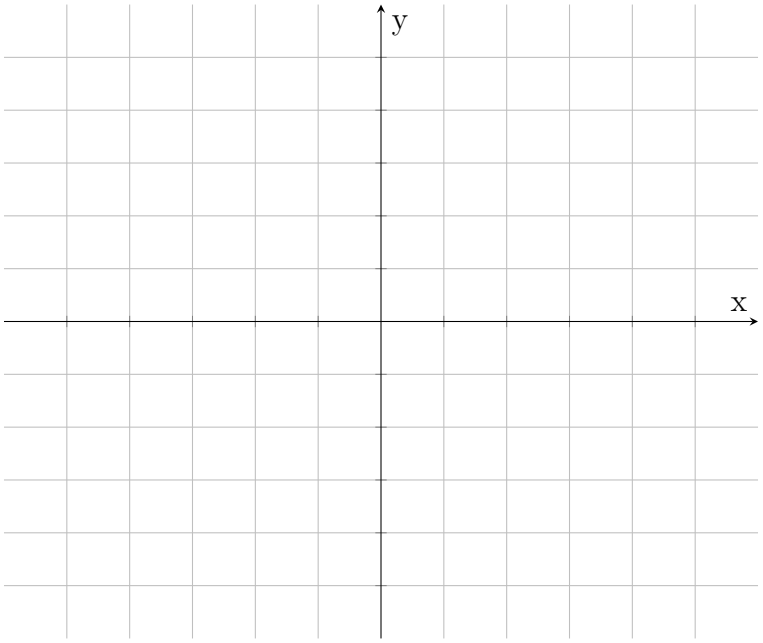
Example 4.1.2
Solve the system by graphing:

$$\begin{cases} 2x + y = 6 \\ 2x - y = -2 \end{cases}$$

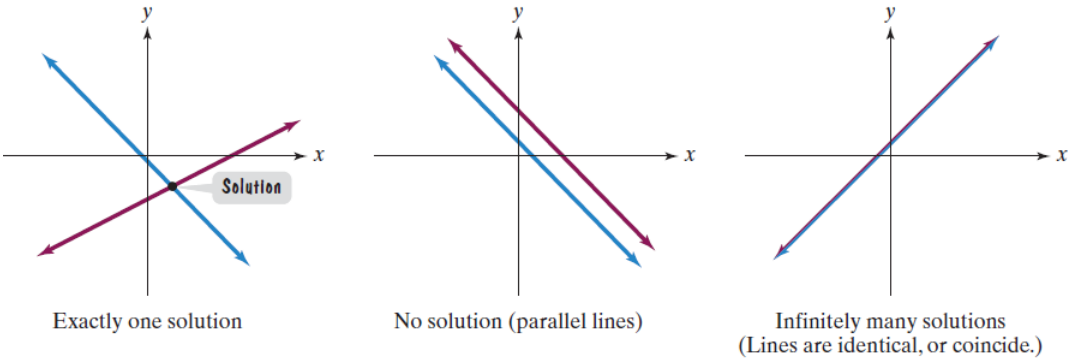


Example 4.1.3
Solve the system by graphing:

$$\begin{cases} y = -x + 6 \\ y = 3x - 6 \end{cases}$$



Other Types of Solutions



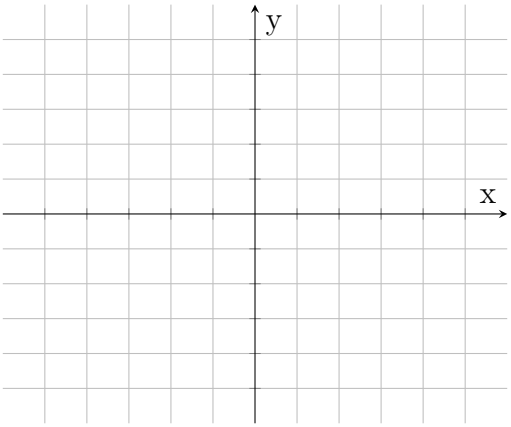
Exactly one solution

No solution (parallel lines)

Infinitely many solutions
(Lines are identical, or coincide.)

Example 4.1.4
Solve the system by graphing:

$$\begin{cases} y = 3x - 2 \\ y = 3x + 1 \end{cases}$$



Example 4.1.5
Solve the system by graphing:

$$\begin{cases} x + y = 3 \\ 2x + 2y = 6 \end{cases}$$