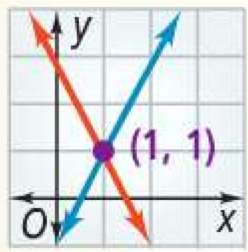
CHAPTER 3: Linear Systems

Find a point of intersection (x, y) of the graphs of functions f and g and you have found a solution of the system $y = f(x)$, $y = g(x)$.

Solving Systems Using Tables and Graphs (Lesson 3-1)

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



The solution is (1, 1).

A **system of equations** has two or more equations. Points of intersection are solutions. A **linear system** has linear equations. A **consistent system** can be **dependent**, with infinitely many solutions, or **independent**, with one solution. An **inconsistent system** has no solution.

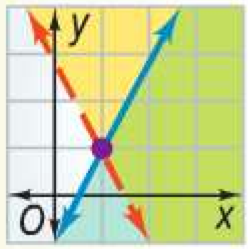
Solving Systems Algebraically

To solve an independent system by substitution, solve one equation for a variable. Then substitute that expression into the other equation and solve for the remaining variable.

To solve by elimination, add two equations with additive inverses as coefficients to eliminate one variable and solve for the other. In both cases you solve for one of the variables and use substitution to solve for the remaining variable.

Systems of Inequalities and Linear Programming (Lessons 3-3 and 3-4)

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



Linear programming is used to find a minimum or maximum of an **objective function**, given **constraints** as linear inequalities. The maximum or minimum occurs at a vertex of the **feasible region**, which contains the solutions to the system of constraints.

Step 1: Graph the system of constraints.

Step 2: Identify the vertices of the feasible region.

Step 3: Substitute each point into the objective function, and identify the maximum or minimum.

A **matrix** can represent a system of equations where each row stands for a different equation. The columns contain the coefficients of the variables and the constants.