

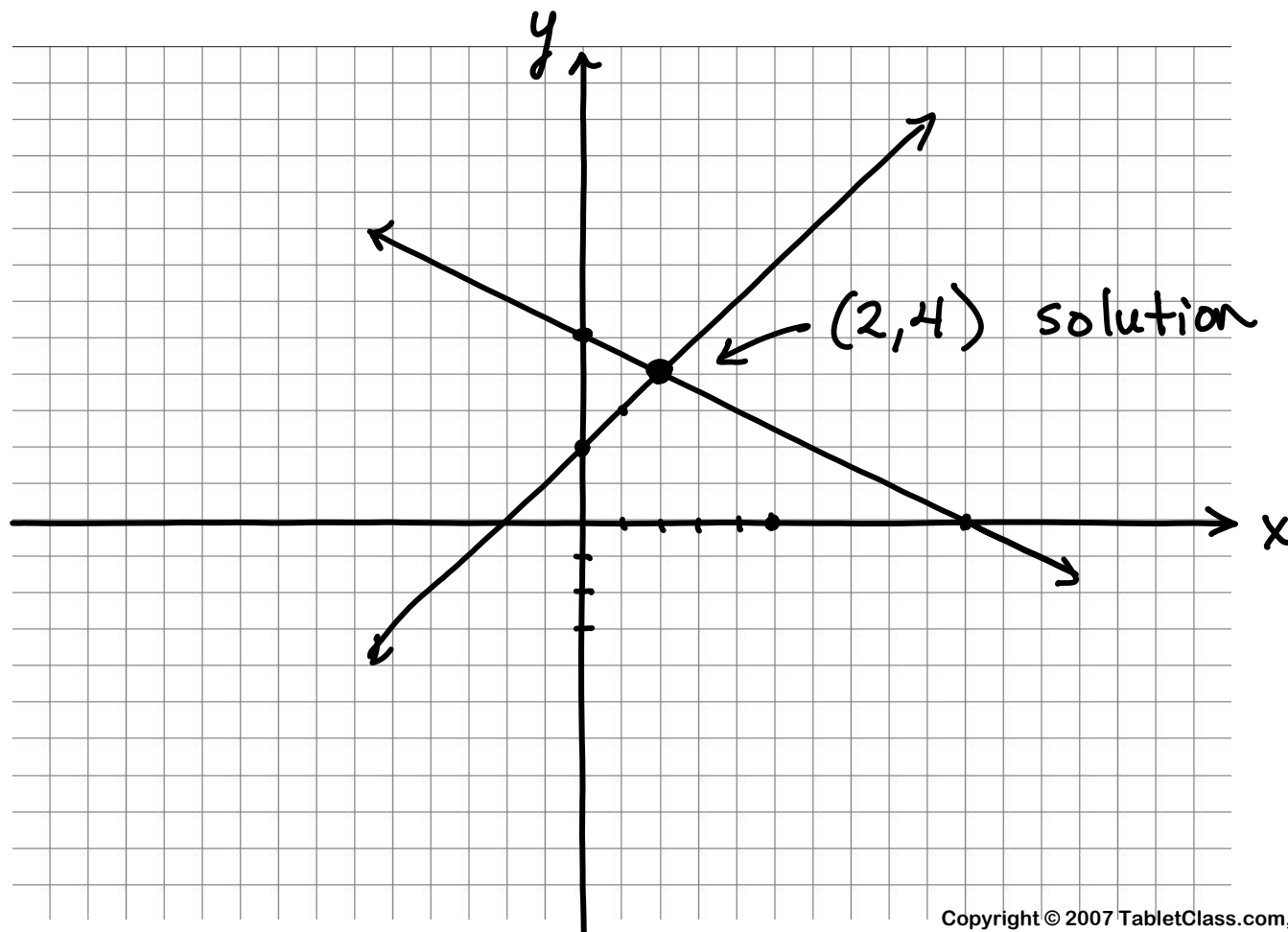


Solve Systems by Graphing

- Graph the lines in the system
- The point where the lines intersect is the solution $(2, 4)$

Example,

Solve the system by graphing $\begin{cases} y - x = 2 \\ 2y + x = 10 \end{cases}$





Substitution Method

Steps

1. Solve for one variable in one equation
2. Substitute into the other equation - making one equation with one variable
3. Solve the one variable equation
4. Use the solution to solve for other variable

Example,

$$\begin{cases} y - x = 2 \\ 2y + x = 10 \end{cases}$$

$$\begin{cases} y - x = 2 \\ \boxed{y = x + 2} \end{cases} \text{ step 1}$$

$$\begin{cases} \boxed{y = (x + 2)} \\ 2y + x = 10 \end{cases} \text{ step 2}$$

$$\begin{aligned} 2(x + 2) + x &= 10 \\ 2x + 4 + x &= 10 \\ 3x + 4 &= 10 \\ 3x &= 6 \\ \boxed{x = 2} \end{aligned} \text{ Step 3}$$

$$\begin{aligned} x &= 2 \\ \downarrow \\ y &= x + 2 \end{aligned}$$

$$y = 2 + 2 = 4 \rightarrow \boxed{y = 4}$$

the solution is (2, 4)



Linear Combination Method

Steps

1. Line up respective variables in column
2. If needed multiply one or both equations by a number(s) to create two terms that are opposite
3. Add the equations to eliminate a term
4. Solve the one variable equation
5. Use the solution to solve for the other variable

$$\begin{array}{r} y - x = 2 \\ 2y + x = 10 \end{array} \leftarrow \text{step 1}$$

$$\begin{array}{r} y - \blacksquare = 2 \\ 2y + \blacksquare = 10 \end{array} \leftarrow \text{Step 2 - the } x \text{ terms are opposite, they will cancel when the equations are added}$$

Step 3
add the
columns

$$\begin{array}{r} \downarrow y - x = 2 \\ 2y + x = 10 \\ \hline 3y = 12 \end{array}$$

$$\left. \begin{array}{l} 3y = 12 \\ y = 4 \end{array} \right\} \text{step 4}$$

solution (2, 4)

Step 5
use $y = 4$ to
find x

$$\begin{array}{r} y - x = 2 \\ 4 - x = 2 \end{array}$$

$$\boxed{x = 2}$$



Systems of Linear Inequalities

Steps

1. Graph each linear inequality
2. Find the intersection of the lines, solve the system - use any method
3. The overlapping region is the solution

Example - Solve and graph

$$\begin{cases} y - x < 2 & \text{(dash line)} \\ 2y + x \geq 10 & \text{(solid line)} \end{cases}$$

the solution to this system (2,4)

