

7.5 Special Types of Linear Systems

$$\begin{array}{r|l} x & y \\ \hline 20 & 5 \\ \hline 2 & 2 \end{array}$$

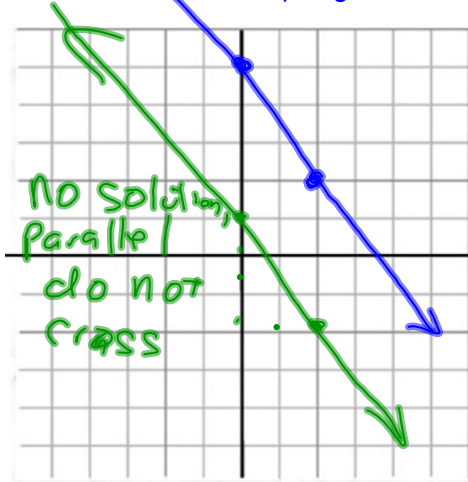
$$3x + 2y = 10$$

$$3x + 2y = 2 \rightarrow$$

$$\begin{aligned} 2y &= -3x + 2 \\ \frac{2y}{2} &= \frac{-3x + 2}{2} \\ y &= -\frac{3}{2}x + 1 \end{aligned}$$

A linear system with no solution

Method 1: Graphing



Method 2: Elimination

$$3x + 2y = 10$$

$$(-) \quad 3x + 2y = 2$$

$$\hline 0 + 0 = 8$$

inconsistent
not true
no solution

$$0 = 8$$

A linear system with infinitely many solutions

$$\begin{array}{r|l} x & y \\ \hline 0 & 2 \\ \hline -4 & 0 \end{array}$$



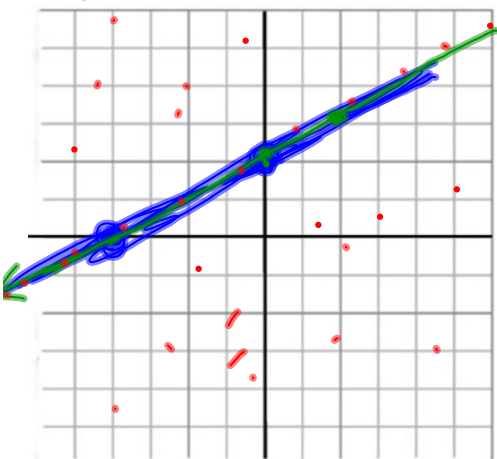
$$x - 2y = -4$$

Equation 1

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

Equation 2

Method 1: Graphing



Method 2: Elimination

$$\begin{aligned} x - 2y &= -4 \rightarrow x - 2y = -4 \\ -\frac{1}{2}x + y &= 2 \xrightarrow{\times 2} -x + 2y = 4 \quad (+) \end{aligned}$$

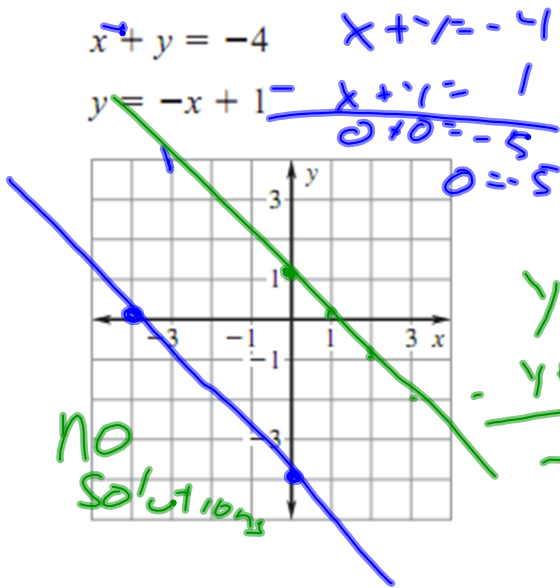
$$\hline 0 + 0 = 0$$

Always true

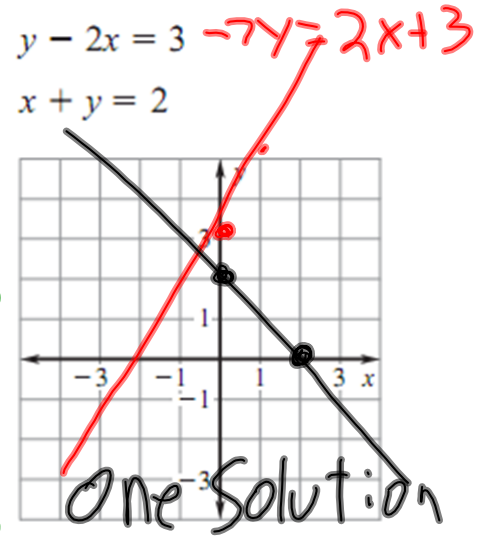
infinite solutions

$$0 = 0$$

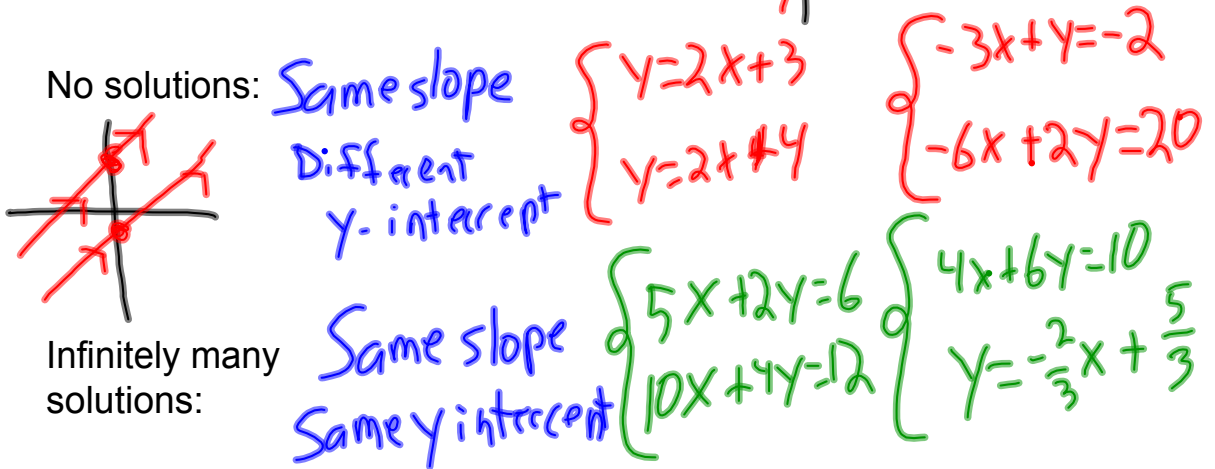
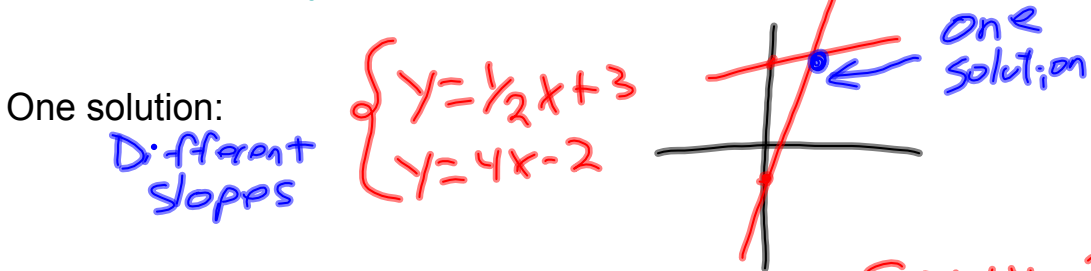
Graph the linear system. Then use the graph to tell whether the linear system has *one solution*, *no solution*, or *infinitely many solutions*.



$$\begin{array}{r} y - 2x = 3 \\ - y + x = -2 \\ \hline -3x = 1 \\ x = -\frac{1}{3} \end{array}$$



Identify the number of solutions



Identify the number of solutions

Without solving the linear systems, tell whether they have *one*, *none*, or *infinitely many* solutions.

$$\begin{aligned}
 5x + y &= -2 \rightarrow y = -5x - 2 \\
 -10x - 2y &= 4 \\
 &\rightarrow -2y = 10x + 4 \\
 &\quad y = -5x - 2
 \end{aligned}$$

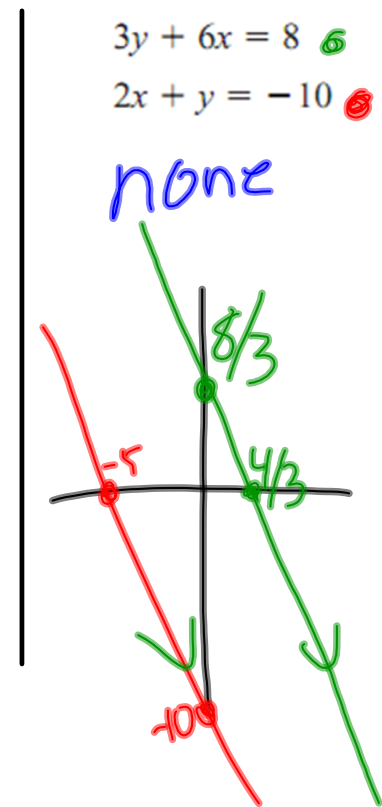
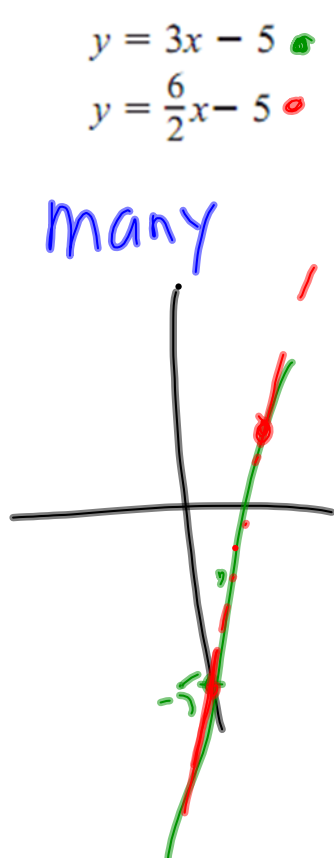
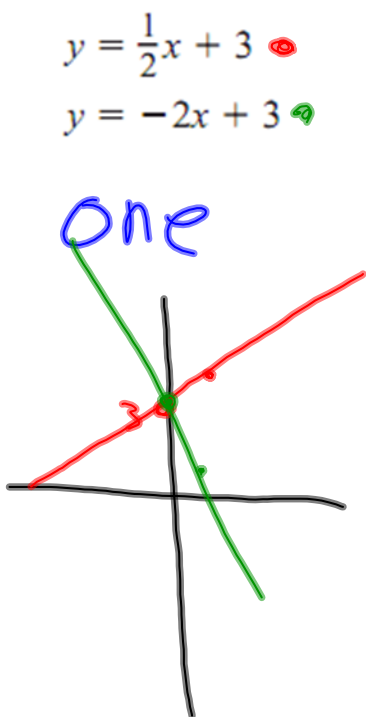
m is same
b is same

many

$$\begin{aligned}
 6x + 2y &= 3 \rightarrow y = -3x + \frac{3}{2} \\
 6x + 2y &= -5 \rightarrow y = -3x - \frac{5}{2}
 \end{aligned}$$

m is same
b is different

no solutions



Write and solve a system of linear equations

A water park charges a fee for admission and a fee to rent a tube for the day. A group pays \$263.25 for admission for 15 people and 8 tube rentals. Another group pays \$358.00 for admission for 20 people and 13 tube rentals. What is the cost of one admission?

$$\begin{array}{l} X - \text{People} \\ Y - \text{Tubes} \end{array} \quad \begin{array}{l} (15x + 8y = 263.25) \times 4 \\ (20x + 13y = 358.00) \times 3 \end{array}$$