

How to Solve Systems of Equations: Graphing, Substitution OR Elimination

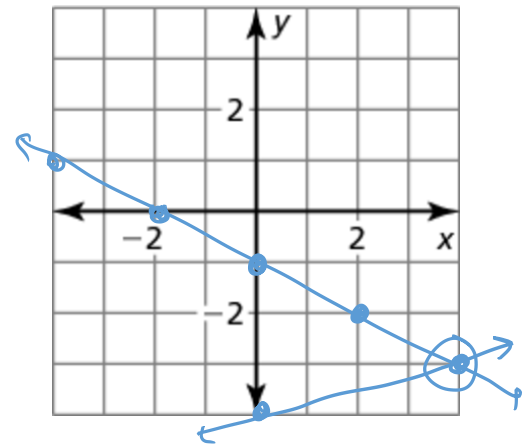
For #1-4) Solve the system of equations ANY way you want ☺ HINT: #4 might be best to graph!

$$\begin{array}{r}
 1. \quad -7x - 2y = -13 \\
 -1 \left(\begin{array}{l} x - 2y = 11 \end{array} \right) \\
 \hline
 3 - 2y = 11 \\
 -2y = 8 \\
 y = -4 \\
 \boxed{(3, -4)}
 \end{array}
 \quad
 \begin{array}{r}
 -7x - 2y = -13 \\
 + \quad -x + 2y = -11 \\
 \hline
 -8x = -24 \\
 x = 3
 \end{array}$$

$$\begin{array}{r}
 2. \quad y = 5x - 3 \\
 3x - 8y = 24 \\
 y = -3 \\
 3x - 8(5x - 3) = 24 \\
 \boxed{(0, -3)} \\
 3x - 40x + 24 = 24 \\
 -37x = 0 \\
 x = 0
 \end{array}$$

$$\begin{array}{r}
 -5 \left(\begin{array}{l} 3x - 2y = 2 \end{array} \right) \\
 3 \left(\begin{array}{l} 5x - 5y = 10 \end{array} \right) \\
 \hline
 -15x + 10y = -10 \\
 + \quad 15x - 15y = 30 \\
 \hline
 -5y = 20 \\
 y = -4 \\
 5x - 5(-4) = 10 \\
 5x + 20 = 10 \\
 5x = -10 \\
 x = -2 \\
 \boxed{(-2, -4)}
 \end{array}$$

$$\begin{array}{r}
 4. \quad y = \frac{-1}{2}x - 1 \\
 y = \frac{1}{4}x - 4 \\
 \boxed{(4, -3)}
 \end{array}$$



Applications:

5. Jack and Jill decide to buy new school supplies one day. Jack buys 2 packs of pencils and 3 packs of pens for \$8.25. Jill buys 5 packs of pencils and 2 packs of pens for \$11.00. How much does one pack of pencils and one pack of pens cost?

Define the Variables:	System of Equations:	Solution:
$x = \text{cost of one pack of pencils}$	$-5 \left(\begin{array}{l} 2x + 3y = 8.25 \end{array} \right) \Rightarrow -10x - 15y = 41.25$	\$ 1.50 for one pack of pencils
$y = \text{cost of one pack of pens}$	$2 \left(\begin{array}{l} 5x + 2y = 11 \end{array} \right) \Rightarrow \begin{array}{l} + \quad 10x + 4y = 22 \\ \hline -11y = -19.25 \\ y = 1.75 \end{array}$	
	$2x + 3(1.75) = 8.25$	\$ 1.75 for one pack of pens
	$2x + 5.25 = 8.25$ $2x = 3$ $x = 1.50$	

Graphing Calculator:

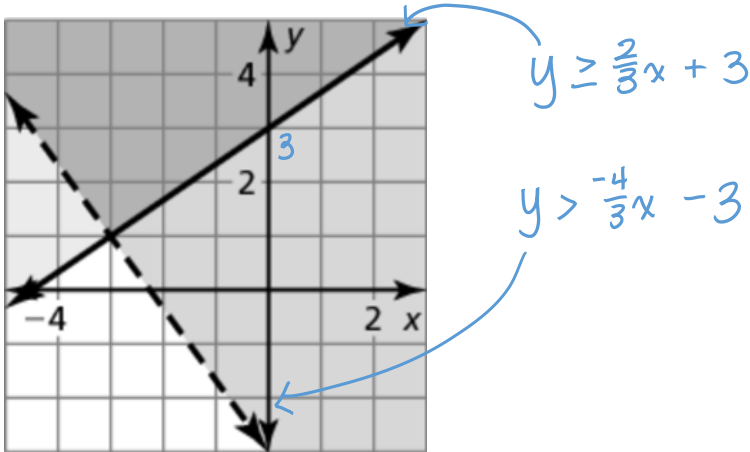
6. Find the solution to the system by using your graphing calculator.

$$\begin{array}{r}
 2y = -3x + 80 \Rightarrow y = -\frac{3}{2}x + 40 \\
 y = x - 60 \\
 \boxed{(40, -20)}
 \end{array}$$

Check by using elim./sub!

Graphing System of Linear Inequalities:

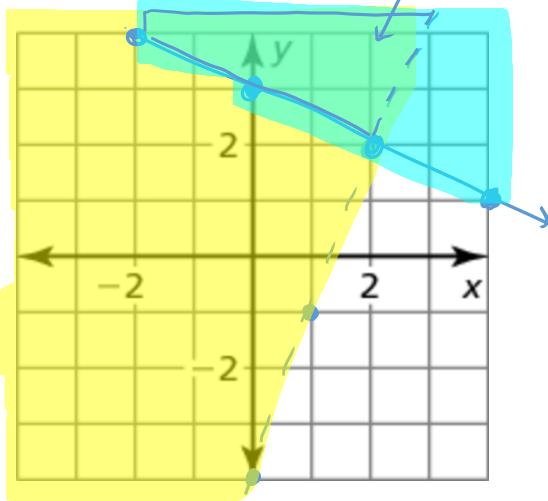
7. Write a system of linear inequalities for the following graph.



8-9) Graph the system of linear inequalities. Try to be AS NEAT AS POSSIBLE when shading 😊

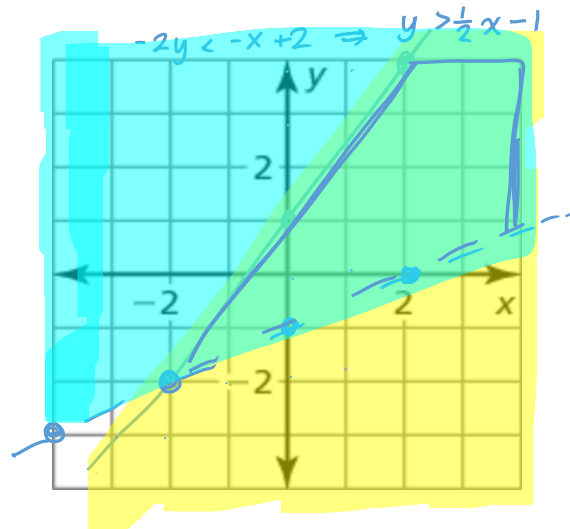
8. $y < 3x - 4$ $0 < 4$ ✓

$y \geq -\frac{1}{2}x + 3$ $0 \geq 3 \times$ solution set = green



9. $3x - 2y \geq -2 \Rightarrow -2y \geq -3x - 2$

$x - 2y < 2$ $y \leq \frac{3}{2}x + 1$



Linear Programming: Graph the inequalities in the first quadrant and find the vertices of the feasible region.

$y \leq -2x + 6$

$2y \leq -x + 6 \Rightarrow y \leq -\frac{1}{2}x + 3$

$x \geq 0$

$y \geq 0$

Vertices
 (0,0) (0,3) (3,0)
 (2,2)

