

SYSTEM OF LINEAR INEQUALITIES

 Guide Notes

SYSTEM OF LINEAR INEQUALITIES: is a set of linear inequalities that you deal with all at once. Usually you start off with two or three linear inequalities.

A system of inequalities can be solved graphically and non-graphically.

STEPS TO SOLVE SYSTEM OF LINEAR INEQUALITIES

1. Graph each linear inequality as an equality, giving values or finding the intercepts with the axes.
2. If you have closed dots \leq, \geq , it must be graphed a complete line and if you have open dots $>, <$, it must be graphed as a dotted line.
3. After graphing both lines, prove the solution by evaluating a point that belongs to the region you consider is the solution region and if it satisfies the linear inequalities, then that proves that is the solution region.

Sample Problem 1: Solve the system of inequalities:

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

We have to graph each of the linear function that compound the system. One easy way to graph each linear function is to find its intercepts with the axes.

- $y = -2x + 6$

$$x = 0 \rightarrow y = 6 \rightarrow (0,6)$$

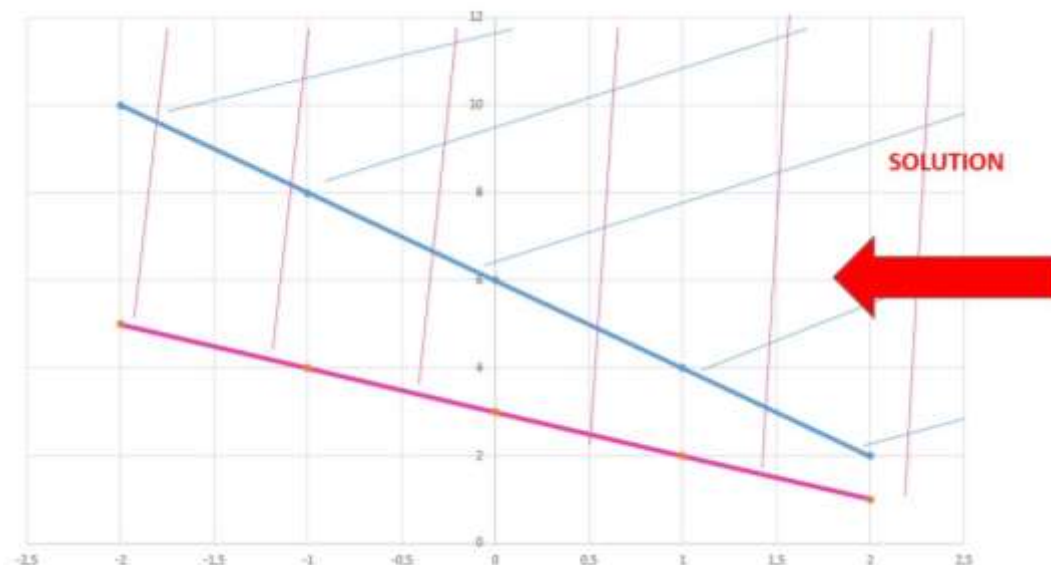
$$y = 0 \rightarrow x = 3 \rightarrow (3,0)$$

- $y = -x + 3$

$$x = 0 \rightarrow y = 3 \rightarrow (0,3)$$

$$y = 0 \rightarrow x = 3 \rightarrow (3,0)$$

SYSTEM OF LINEAR INEQUALITIES Guide Notes



Proving with the point (1,6) that belongs to the solution region to verify if it satisfies the inequalities:

$$2(1) + 6 \geq 0 \rightarrow 8 > 6$$

$$1 + 6 \geq 3 \rightarrow 7 > 3$$

Sample Problem 2: Solve the following system of inequalities:

$$\begin{cases} x + y > 2 \\ -x + y < 5 \end{cases}$$

We have to graph each of the linear function that compound the system. One easy way to graph each linear function is to find its intercepts with the axes.

- $y = -x + 2$

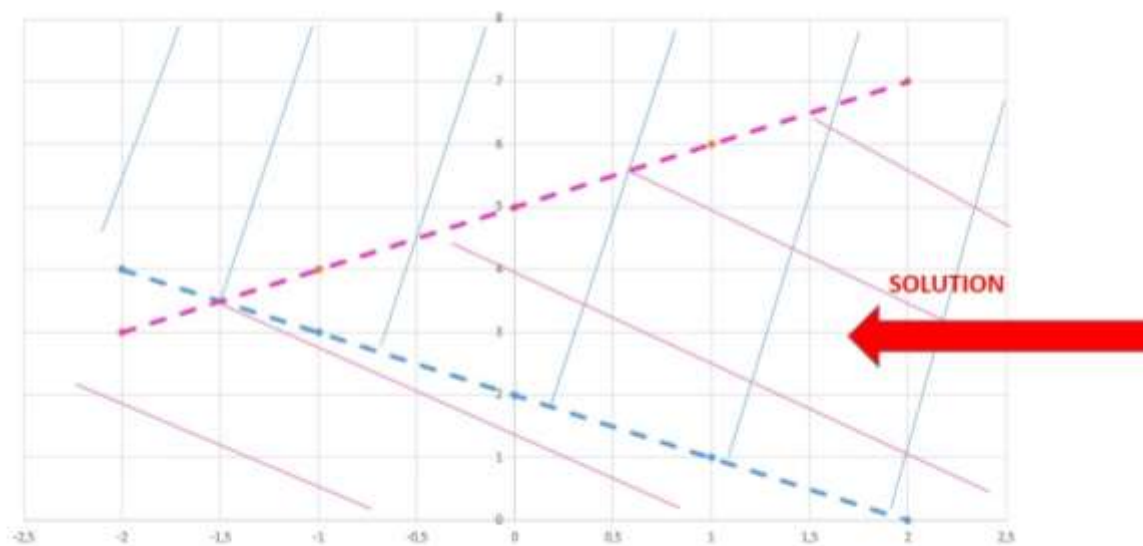
$$x = 0 \rightarrow y = 2 \rightarrow (0, 2)$$

$$y = 0 \rightarrow x = 2 \rightarrow (2, 0)$$

- $y = x + 5$

$$x = 0 \rightarrow y = 5 \rightarrow (0, 5)$$

$$y = 0 \rightarrow x = -5 \rightarrow (-5, 0)$$

SYSTEM OF LINEAR INEQUALITIES Guide Notes

Proving with the point (1,3) that belongs to the solution region to verify if it satisfies the inequalities:

$$1 + 3 > 2 \rightarrow 4 > 2$$

$$-1 + 3 < 5 \rightarrow 2 < 5$$

Sample Problem 3: Word problem of system of linear inequalities:

John is shopping for baseballs and tennis balls at a sport store. Each baseball ball costs \$4 and each tennis ball costs \$2. He needs to buy at least 40 balls in total, and he has \$100 budget. Write a system of inequalities representing the number of balls he could buy.

X= Number of baseball balls

Y= Number of tennis balls

$$\begin{cases} 4x + 2y \leq 100 \\ x + y \geq 40 \end{cases}$$

Simplifying the first inequality we have:

SYSTEM OF LINEAR INEQUALITIES Guide Notes

$$\begin{cases} 2x + y \leq 50 \\ x + y \geq 40 \end{cases}$$

We have to graph each of the linear function that compound the system. One easy way to graph each linear function is to find its intercepts with the axes.

- $y = -2x + 50$

$$x = 0 \rightarrow y = 50 \rightarrow (0, 50)$$

$$y = 0 \rightarrow x = 25 \rightarrow (25, 0)$$

- $y = -x + 40$

$$x = 0 \rightarrow y = 40 \rightarrow (0, 40)$$

$$y = 0 \rightarrow x = 40 \rightarrow (40, 0)$$

