Lesson 2-6: Systems of Inequalities I can solve a System of Linear Inequalities by Graphing.
I can Find the Minimum and Maximum of an Objective Function.

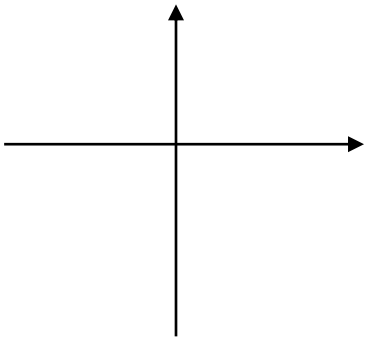
EQ: How do you solve a system of inequalities by graphing?

EX.1 - Solving a System by Graphing

Graph the system of Linear Inequalities.

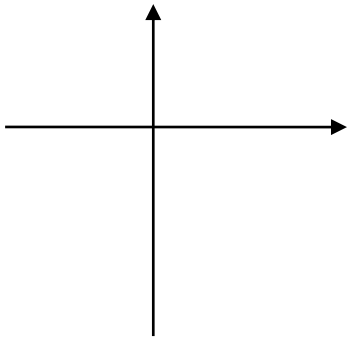
a.

$$y > -2$$
$$y \leq 1$$



b.

$$y > 2x - 7$$
$$4x + 4y < -12$$



Steps for graphing a system of Linear Inequalities

1. Graph both corresponding lines. If the $< or >$ $use\ a\ dashed\ line; If\ the\ symbol\ is\ \leq or \geq use\ a\ solid\ line.$
2. Determine which way to shade by checking a point away from each line. (plug it into the inequality)

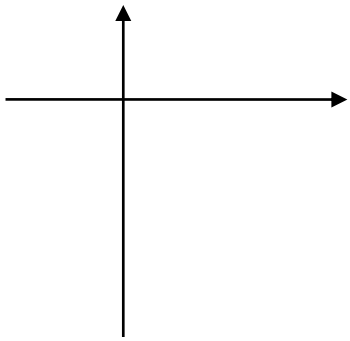
- If you get a yes, shade that direction
- If you get a no, shade the other direction

2. Then shade (darken) the region that contains the common points

3. Check a point inside the shaded region to confirm your answer

c.

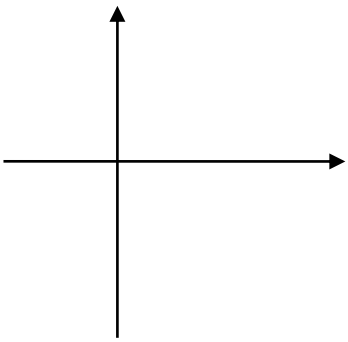
$$y \geq -3x + 2$$
$$5x - 2y \leq -10$$



Check (,)

d.

$$y < 4$$
$$y \geq |x - 3|$$



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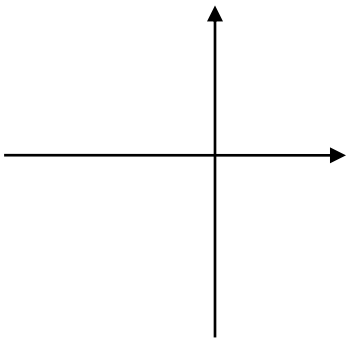
e.

$y \geq x$

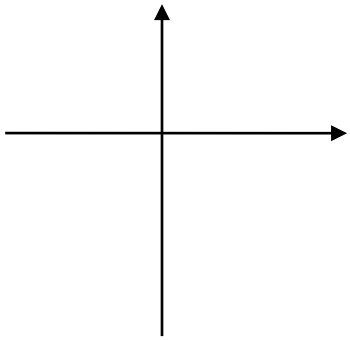
$y \leq |x + 5| - 2$



f.

$y \geq -2x + 4$

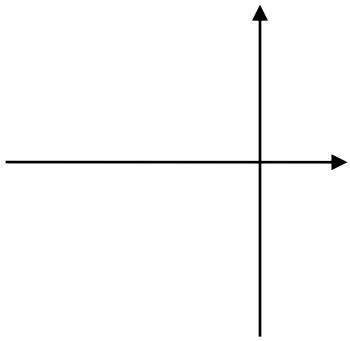
$y \leq |x - 4|$



g.

$y \geq 3$

$y > -|x + 2| + 5$



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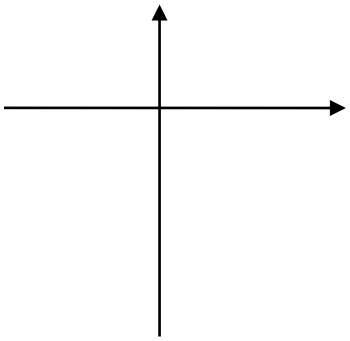
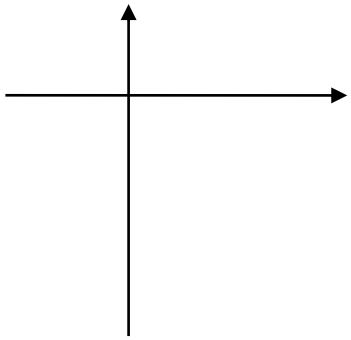
h. Check (,)

$-2 \le x \le 5$
$y \ge 0$
$y \le 2x + 1$



i. Check (,)

$x \le 0$
$y + 3 \ge 0$
$x \ge y$



Short Summary#1:

EX 2 – FINDING MAXIMUM AND MINIMUM
Vertex Theorem:
The **maximum** or **minimum** value of
f(x, y) = ax + by + c
on a polygonal convex set occurs at a vertex of the polygonal boundary.
Find the maximum and minimum value for each function with the given vertices.

a. f(x, y) = 4x + 2y

A(0, 0), B(0, -4), C(3, -5), & D(8, 0)

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b. $f(x, y) = x - 5y + 3$

J(1, 0), K(1, 9), L(6, -2), & M(8, 5)

c. $f(x, y) = 4y + 7x - 1$

R(-2, -1), S(-2, 0), T(-1, 10), U(3, 1) & V(7, 10)

EX.3 – Finding the Minimum and Maximum for a Polygonal Covex Set.

Find the maximum and minimum values for the polygonal convex set, defined by the system of inequalities.

a. $f(x, y) = 4x - 3y + 7$

$x \geq 0$

$y \geq 1$

$x + y \leq 4$

b. $f(x, y) = -2x + y + 5$

$2 \leq y \leq 8$

$x \geq 1$

$2x + y \leq 14$

$y \geq 5 - x$

c. $f(x,y) = -2x + y + 5$
$0 \leq x \leq 8$
$y \geq -1$
$y \leq 0.5x + 1$

EX.4 - APPLICATION

1. An entrance exam has two parts, a verbal part and a mathematics part. You can score a maximum total of 1600 points. For admission, the school of your choice requires a math score of at least 600. Write a system of inequalities to model scores that meet the school's requirements. Then solve the system.

2. Another school requires a math score of at least 550 points and a total score of at least 1100 points. You can score up to 800 points on each part. Write and solve a system of inequalities to model scores that meet the school's requirements.

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3. Jenna spends at most 150 minutes a night on math and science homework. She spends at least 60 minutes on math. Write and solve a system of inequalities to model how she allots her time for these two subjects.

Short Summary #2:

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EQ: How do you solve a system of inequalities by graphing?