Concept: Solving Inequalities

Name:

- **You should have completed Equations – Section 7 Part A: Solving Inequalities before beginning this handout.**

COMPUTER COMPONENT

Instructions: In UMATH X follow the **Content Menu** path:

Equations > **Solving Inequalities**

NOTE: *Use the **Menu** button in order to get to the lesson where you left off.*

Work through all Sub Lessons of the following Lessons **in order**:

- *Graphing Linear inequalities in Two Variables*
- *Solving Systems of Linear Inequalities by Graphing*
- *Linear Programming*

Additional Required Materials: Pencil Crayons

As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

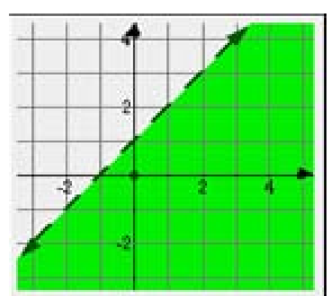
NOTES:

Graphing Linear Inequalities in Two Variables

The solution is not a ________________________ on the graph.

The solution is a _________________________ of the graph.

The graph displays the linear inequality $y < x + 1$



The points **on** the boundary line (_______________ line)

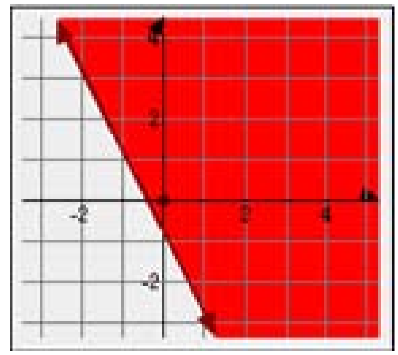
represent all points where y ______ x+1.

The points **below** the boundary line (________________ line) represent all points where y _____________x +1.

The graph displays the linear inequality y ≥ -2 x - 1

The points **on** the boundary line (______________ line)

represent all points where y ______ -2 x - 1



The points **above** the boundary line (_______________ line)

represent all points where y ____________ -2 x - 1.

Checking a point on either side of the boundary line will help determine if that region is in the solution.

Steps to graphing Linear Inequalities in Two Variables: (*Fill in the blanks*)

Step 1: ______________________ the boundary line.

Step 2: Determine if the boundary line is _______________ or ________________.

Step 3: Pick a point on either side of the line and check if that point is in the solution.

Example: y < x + 1

Check (0, 0)   y   <   x   + 1

____ < _____ + 1

____ < _____

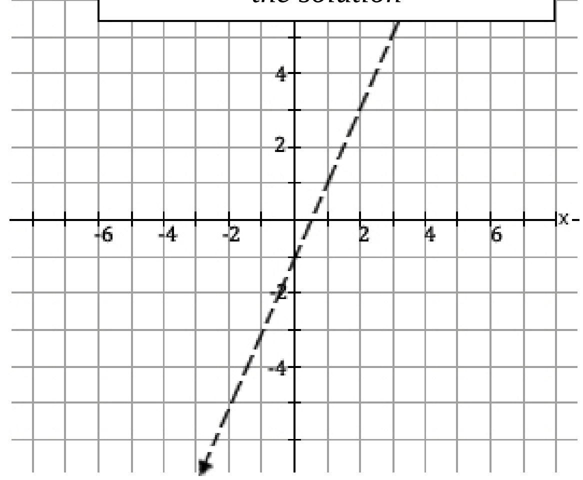
If it is true then (0, 0) is part of the solution

The graph of the linear inequality y < 2x - 1 is shown.

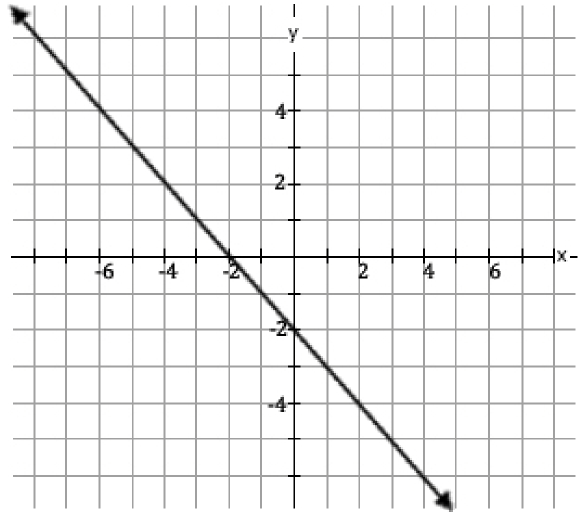
(a) Color the region covering points that make the inequality true.

(b) Indicate the boundary line.

(c) Write the equation for the boundary line.



The graph of the linear inequality $y \geq -x - 2$ is shown.



(a) Color the region covering points that make the inequality true.

(b) Indicate the boundary line.

(c) Write the equation for the boundary line.

Explain why some boundary lines are dotted and others are solid.

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____

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Solving Systems of Linear Inequalities by Graphing

- Graph each inequality ______________________________.
- The solution to the system will be the _________________ where the shadings from each

  inequality ________________________________ one another.

Linear Programming:

> *"The food processing industry is perhaps the second most active user of linear programming, where it was first used to determine shipping of ketchup from a few plants to many warehouse."*
>
> *books.google.ca/books?isbn=0387948333*

Linear Programming is a method used to manage ______________________________

and _____________________________.

- Inequalities are used as ___________________________ that _________________

  the business ___________________________.

- The _________________________ of the ________________________ of constraints

  is called the _________________________ _____________________________.

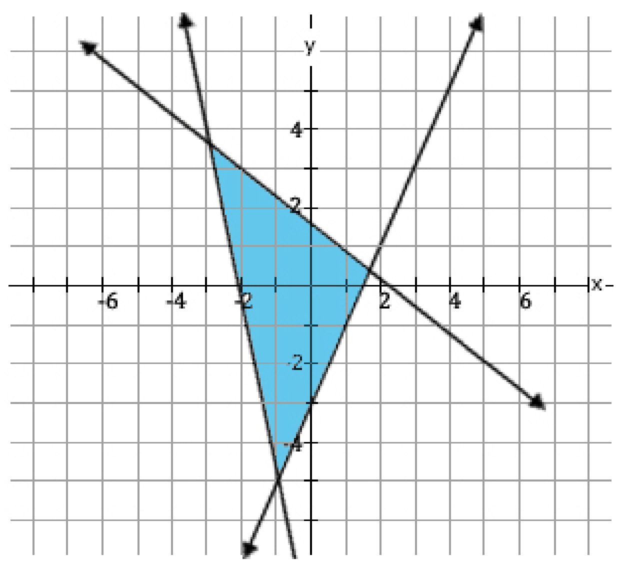
- The ____________________ of the _______________________ region are possible

  _________________________________ and __________________________ values.

In the following graph indicate the following:

(a) Feasible region

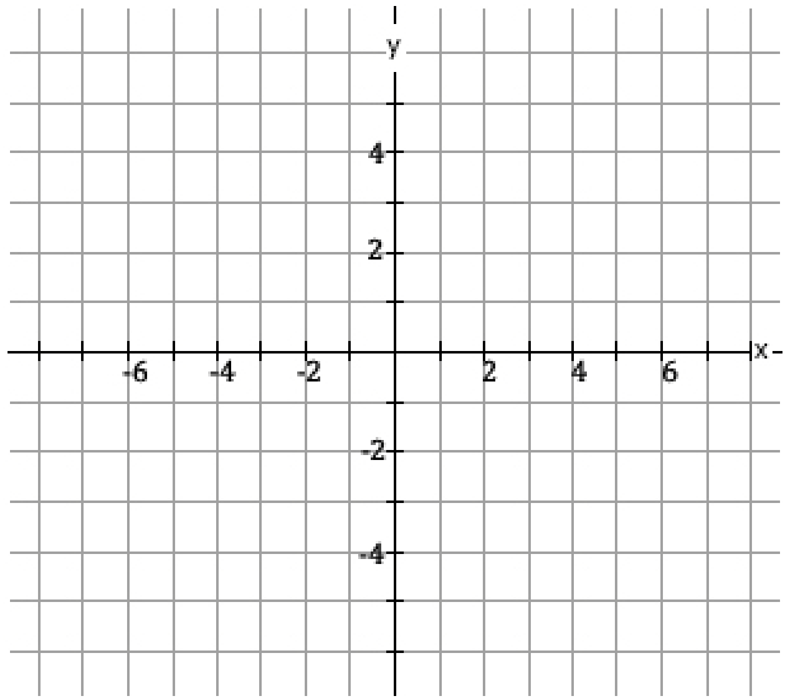
(b) Vertices of the feasible region



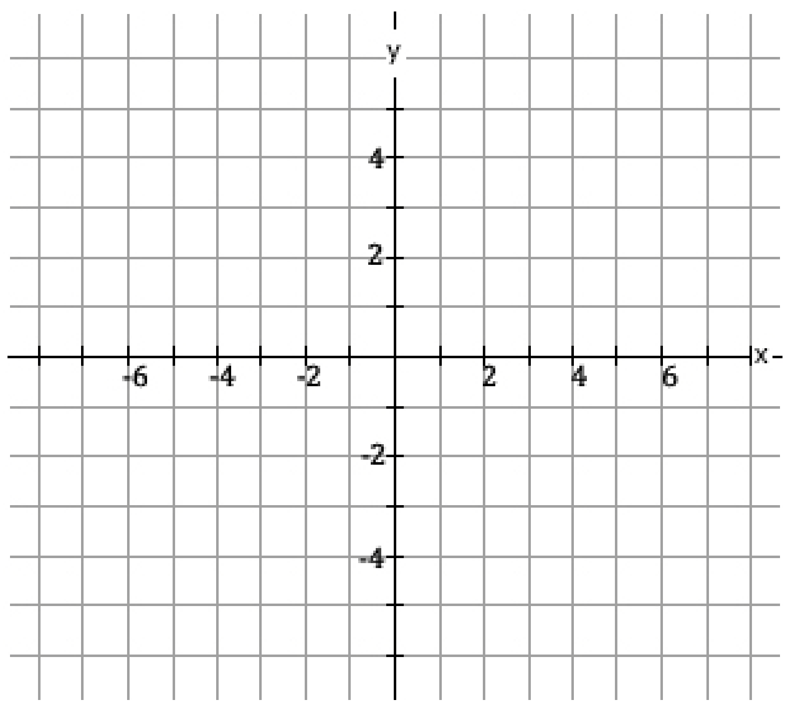
OFF COMPUTER EXERCISES

1. Graph the following inequalities.

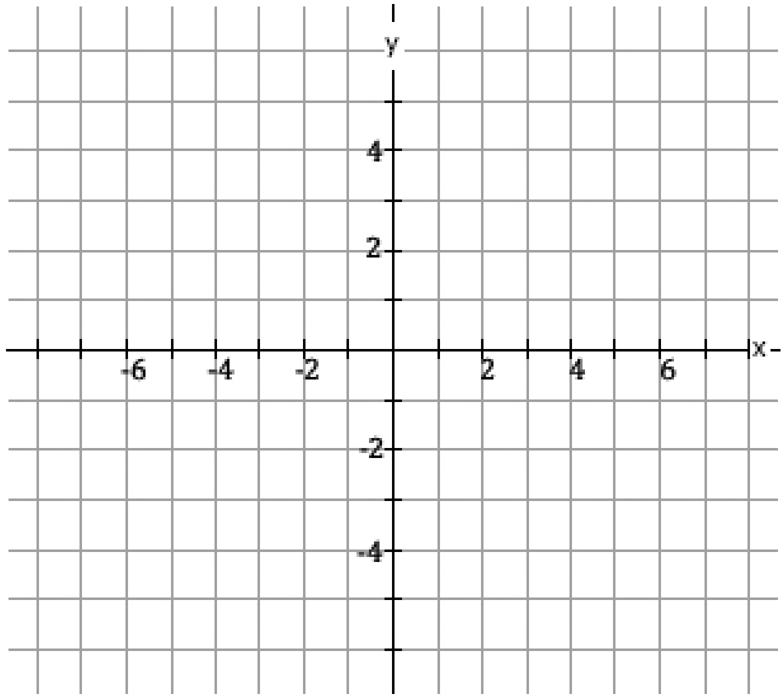
(a) $y > 2x - 4$



(b) $y < -3x + 1$

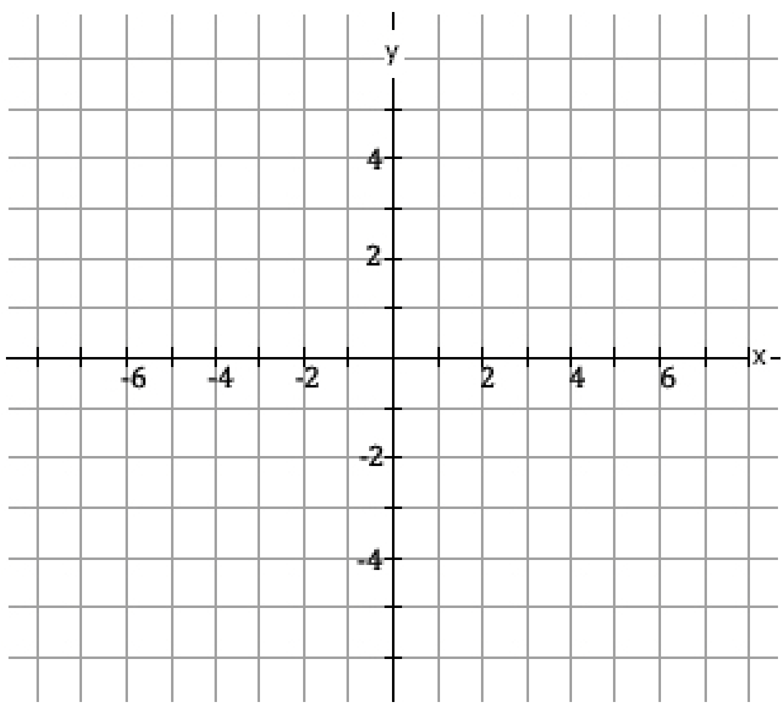


(a) $y \geq \frac{1}{2}x + 3$

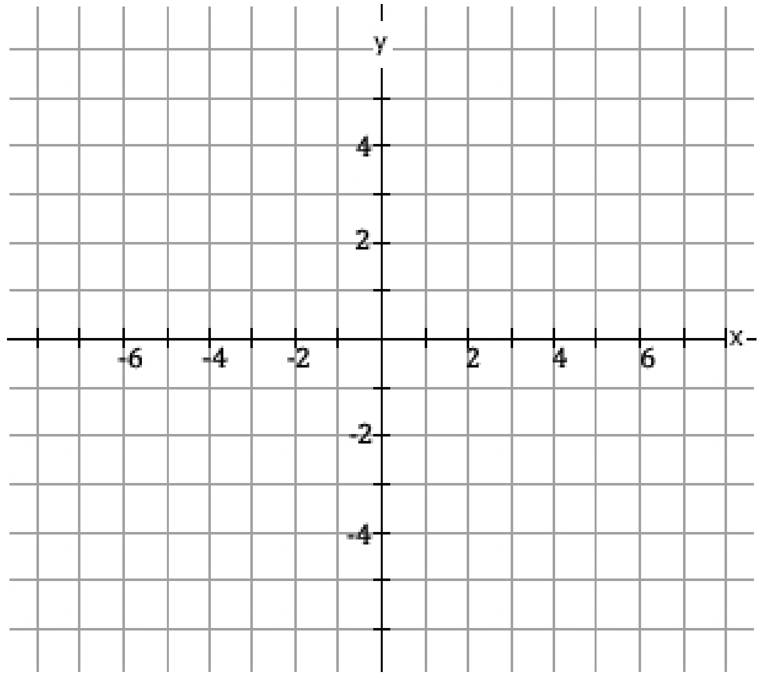


2. Solve each system of inequalities. (*Hint: Find the feasible region.*)

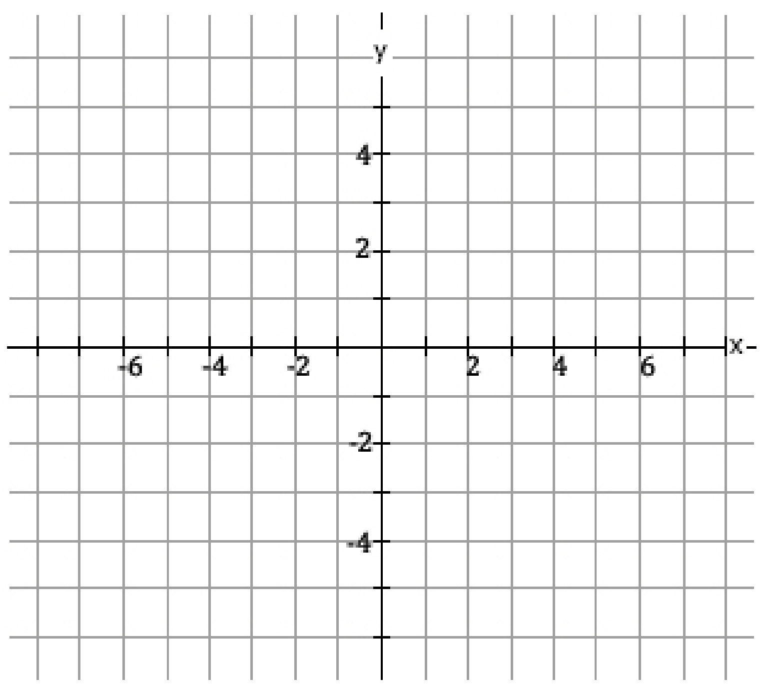
(a) $\begin{Bmatrix} y \geq 2x - 4 \\ y < -x + 5 \end{Bmatrix}$



(b) $\begin{cases} y > \frac{1}{2}x - 3 \\ y \leq 2x - 5 \end{cases}$



(c) $\begin{cases} y > 1 \\ y < x + 2 \end{cases}$



3. A tire manufacturer makes two types of tires; regular and winter. A maximum of 200 regular tires and 125 winter tires can be manufactured in one day. The finishing machine can only handle up to 250 tires in one day. The profit on each regular tire is $25 and on each winter tire is $30. *How many of each type should be made in order to maximize profits?*

Solution:

Let the number of regular tires be represented by x and the number of winter tires be represented by y.

We must now determine our constraints.

x ____________

y ____________

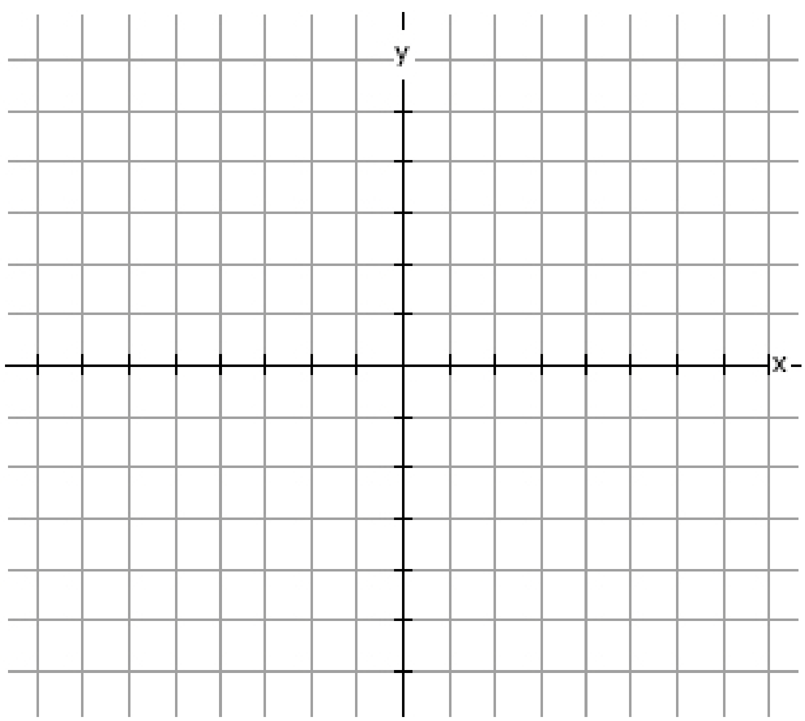
x + y _________________ (*Hint: The finishing machine*)

Graph each of the three constraints above.

Don't forget to shade the appropriate areas in order to find the feasible region.

➢ You should find that your feasible region is formed by 5 vertices:

(0, 0) , (0, ____) , (_____ , 0) , (______ ,50) , (125, _______)



Remembering that our goal is to find what combination will produce the maximum profit, we now want to substitute each set of vertices into the profit equation

P = 25x + 30y *(This information was given to us in the question)*

After all 5 substitutions have been made, *what combination of tire can you conclude will bring the company maximum profit? Justify your answer.*