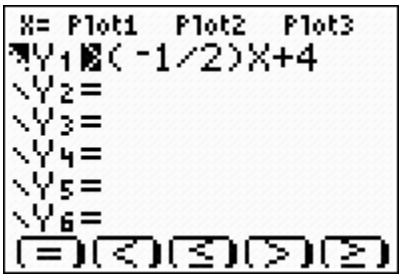
Problem 1 – Graphing one inequality

Start the Inequalities Application by pressing APPS and selecting **Inequalz**.

Suppose the inequality, $y > -\frac{1}{2}x + 4$, can be used to describe a region of the United States on the US/Mexico border.



To graph this inequality, press Y=. Now, with the cursor over the equal sign, press ALPHA then the key directly below the desired symbol (in this case, TRACE.) Now enter the rest of the equation and press ZOOM and select **ZStandard** to view the graph of the inequality.

- What does the dashed line represent? Why is it dashed and not solid, in context of the inequality and in the context of the problem?

- Which side represents US territory? Mexico territory?

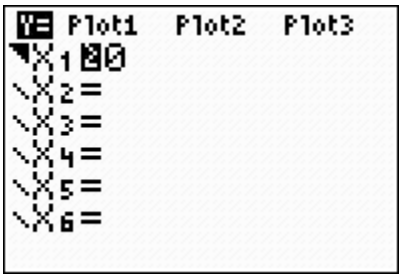
- If the point (8, –1) represents a town, is it a US or Mexican town? Is this a solution to the inequality? Why?

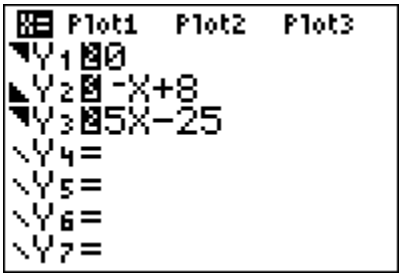
- Use the arrow keys to move to a location that is not a solution to the inequality. What are the coordinates of this point?

Problem 2 – Graphing a system of linear inequalities

The following system of inequalities represents the fenced-in area of someone's yard. Graph the inequalities. To graph the $x \geq 0$, move the cursor to the top-left corner of the screen where the **x=** appears and press ENTER

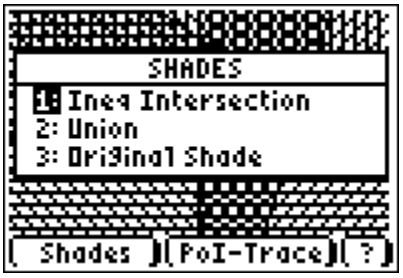
$$\begin{cases} x \geq 0 \\ y \geq 0 \\ y \leq -x + 8 \\ y \geq 5x - 25 \end{cases}$$





Once these have been entered, press ZOOM and select **ZStandard** to view the graphs of these inequalities.

While the graphing window looks very cluttered, there is a way to have it only display the solution to this system of equations (where all the graphs of the inequalities overlap.) To view this region (called the fundamental region) for this system of inequalities, press ALPHA [F2] and select **Ineq Intersection**.



- Why are the lines solid in the context of the system of inequalities? In the context of the problem?

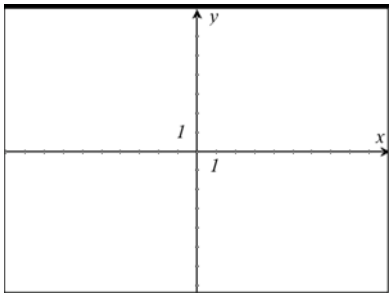
- Suppose the owner wanted to place a post in the yard on which to hang a bird feeder. Give a point that could represent the post (found by using the arrow keys.) What does this point represent for the system of inequalities?

Problem 3 – Practice graphing systems of inequalities

Graph the systems of inequalities given below on your graphing calculator. Copy the graph from your calculator and shade ONLY the solution set below. Then, determine if the points below each graph are solutions to the system.

$x - 5y < 18$

$2x + 3y \geq 10$



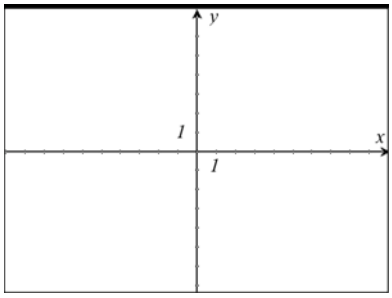
(0,1) (8,-5)

(–1,4) (–4,–1)

(7,3) None of these

$9x + 4y > -7$

$3x - 5y > -34$



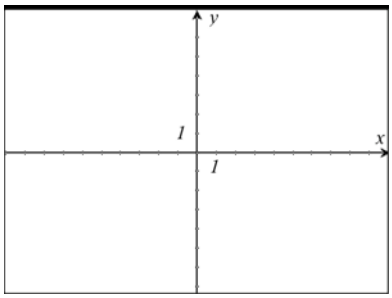
(0,0) (–1,0)

(3,3) (–3,–3)

(–1,8) All of these

$4x - y \leq -11$

$4x - y \geq 7$



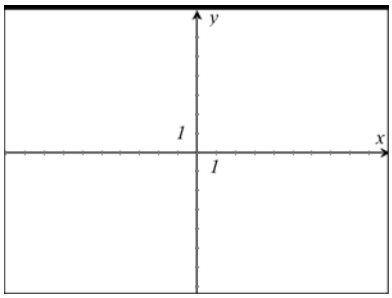
(0,3) (5,8)

(–4,2) (–6,–1)

(2,–4) None of these

$2y < -5x + 10$

$-x + y \geq 5$



(0,0) (2,0)

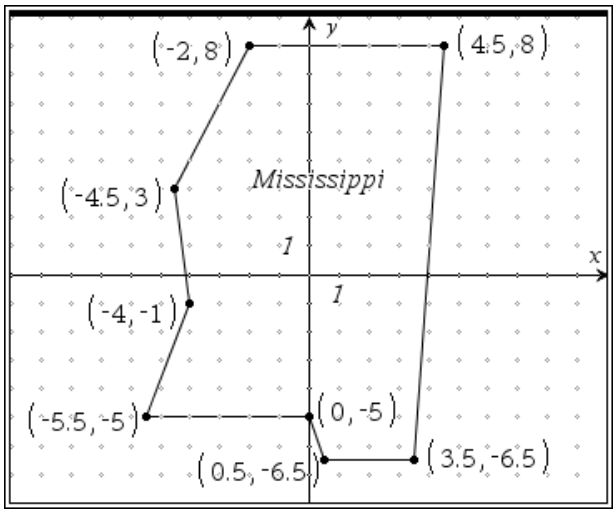
(–8,3) (4,3)

(–2,–4) All of these

- Explain how you know a point is in the solution set without using the graph.

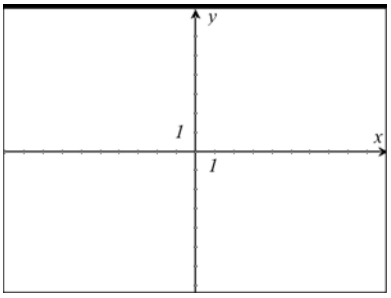
Extension – Writing systems of linear inequalities

1. To the right is an approximate map of Mississippi. Write the system of inequalities whose solution graphs the state of Mississippi.



2. The Student Senate committee must consist of 6 to 9 representatives from the junior and senior classes. The committee must include at least 2 juniors and 3 seniors.
   - Write a system of inequalities to describe the situation.

   - Graph the system and copy the solution of the graph here.



   - Which combinations of juniors and seniors listed below satisfy the system?

     3 juniors, 5 seniors

     2 juniors, 7 seniors

     4 juniors, 4 seniors

     3 juniors, 6 seniors