

Unit 4 Day 6: Solving Systems of Inequalities

Focus Question: How do I find the solution to a system of inequalities?

A: Graphing Systems of Inequalities

Your parents require you to pay for most of your car related expenses (gas, insurance, repairs, loan payment, etc). This comes out to about \$90 a week so you'd like to earn more than that. You have a part time job as a car wash attendant that pays \$6 per hour. You also have a dog-walking job that pays \$7.50 per hour. Your parents only let you work 20 hours each week so you can keep up with your homework.

1. Write an inequality that represents how much you can work at each job to meet your parents limit.

$x + y \leq 20$ $0 + 0 \leq 20$
 $0 \leq 20$
 True

2. Graph the inequality you wrote in part (1).

A **region** is a part of a graph or plane. All inequalities create a region.

3. Describe the region where points representing totals of no more than 20 hours are located.

triangle bounded by the y-axis, x-axis, & $x + y \leq 20$

4. Write and graph the inequality that represents the amount of money you'd like to make each week.

$7.5x + 6y > 90$ $x \text{ int } y=0$
 $7.5x + 6(0) > 90$
 $\frac{7.5x}{7.5} > \frac{90}{7.5}$
 $x > 12$

5. Give a solution to your work hours.

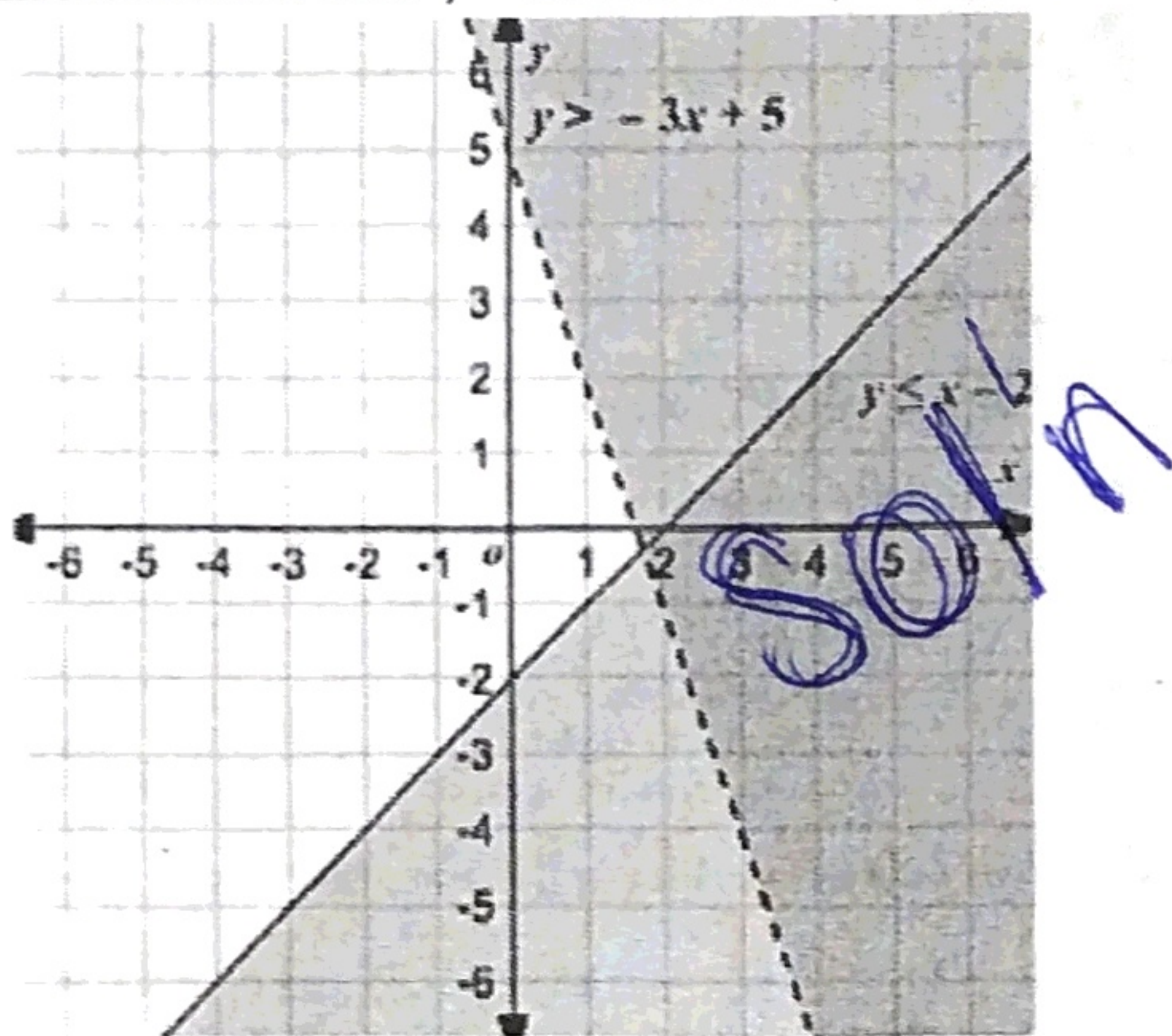
(10, 4) 10 hr. dog walking
 4 hrs. car wash

Because an inequality is more than just a line, (it is the line, plus the region of points that make the inequality true) a system of them always has ...

infinitely many solutions

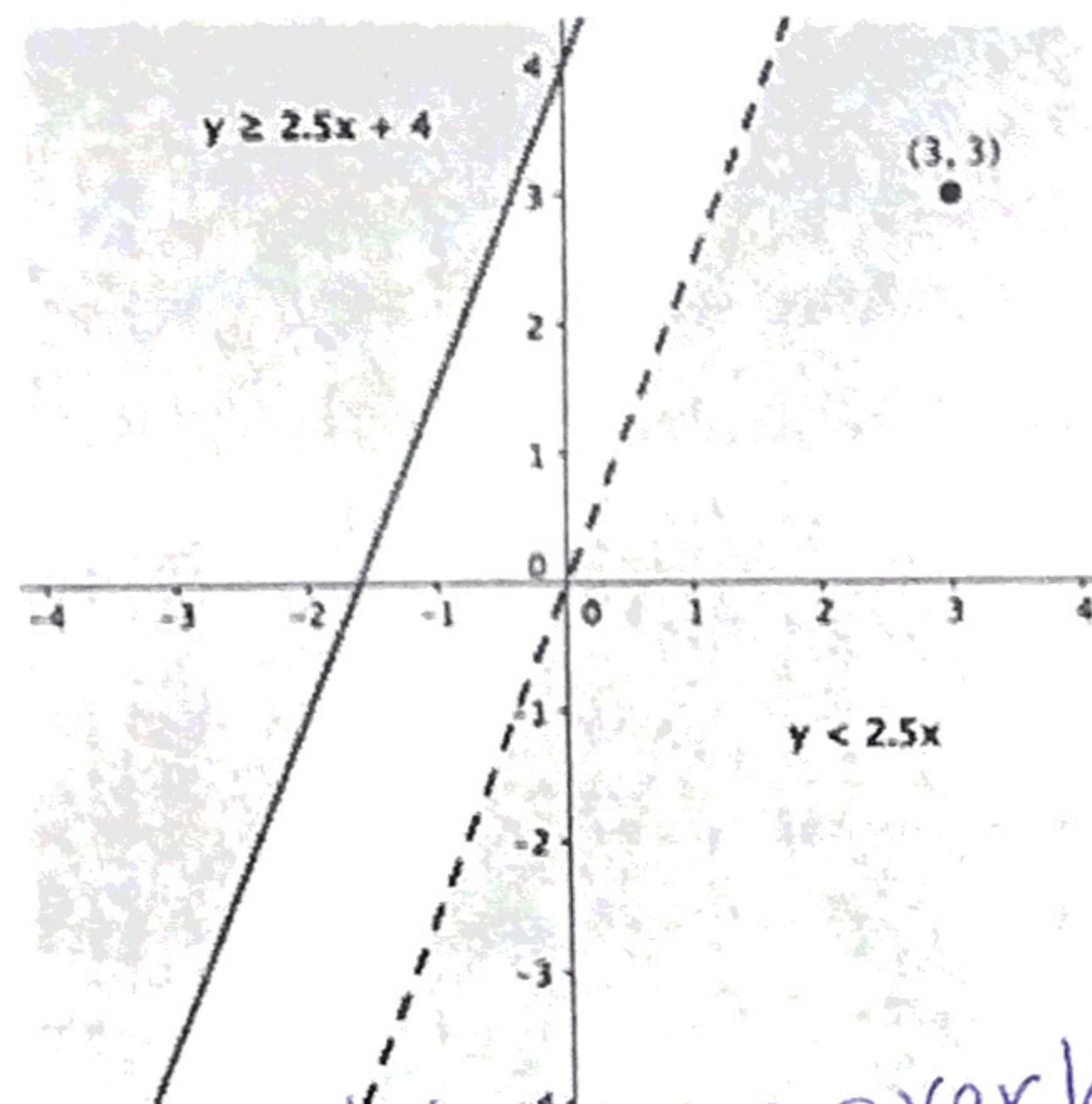
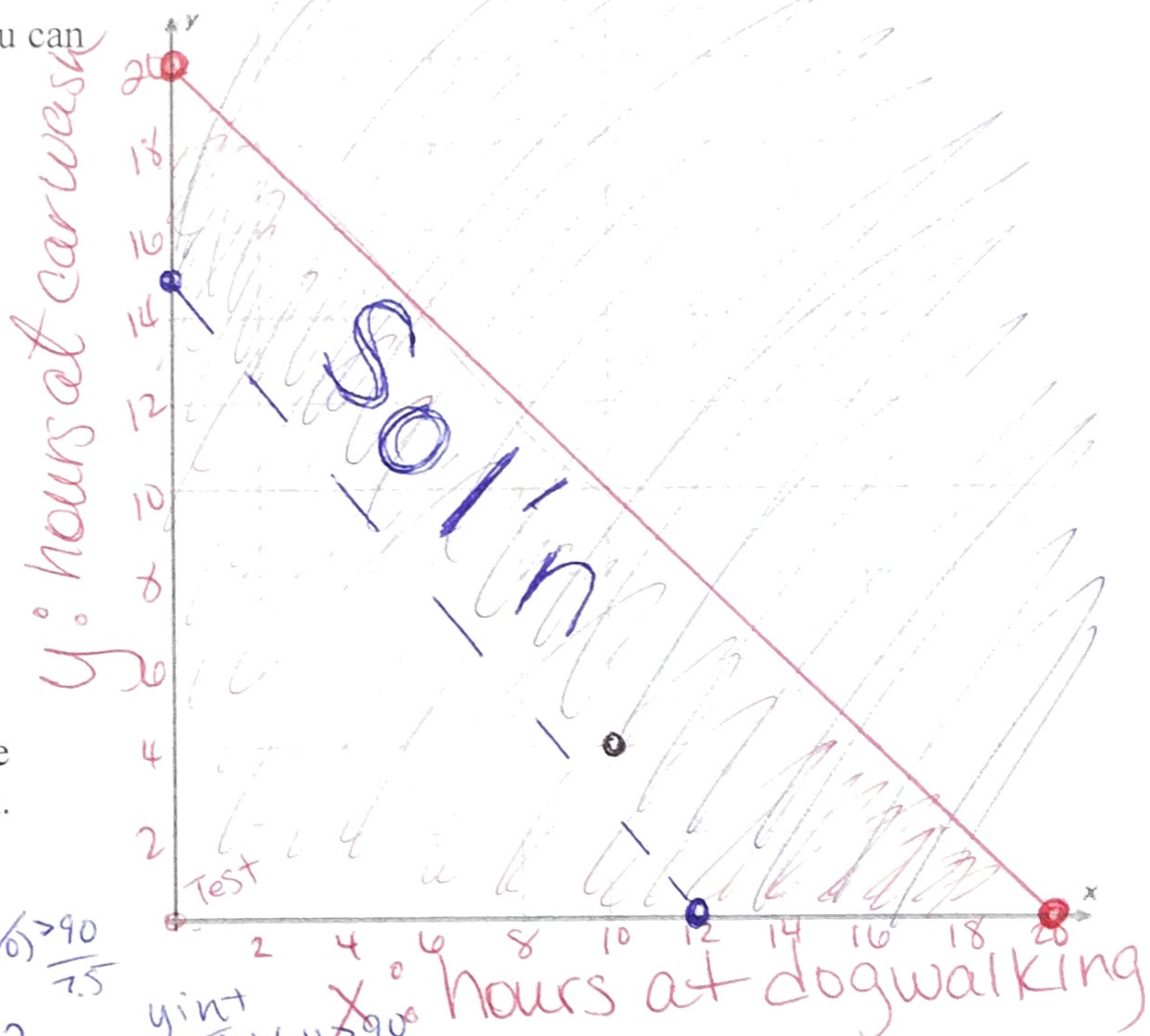
or

no solutions.



5. Why will there never be just one solution? **No!**

b/c inequalities create regions



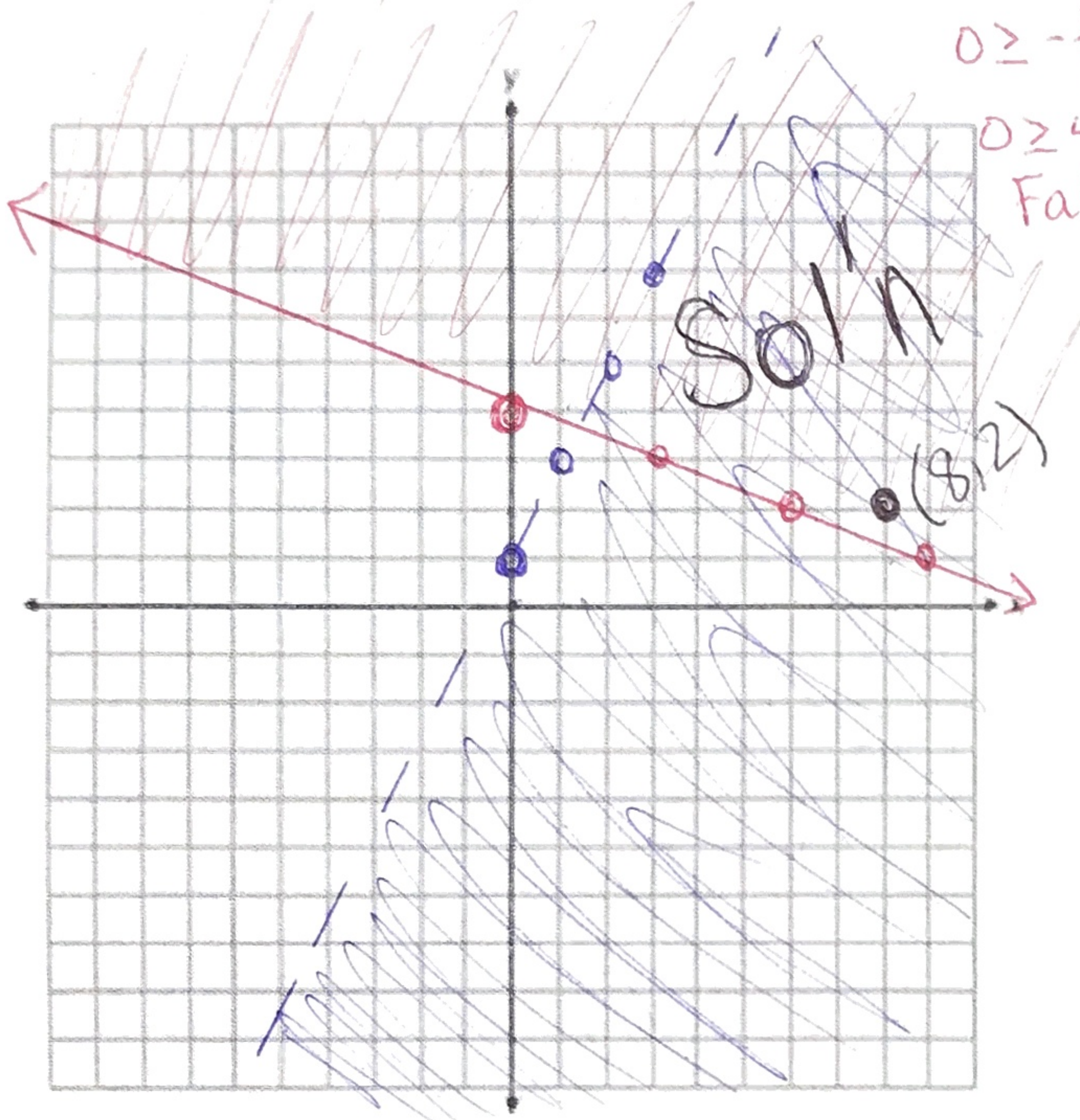
parallel, so no overlap b/c of $>$ & $<$

On the set of axes below, solve the following system of inequalities graphically.

dash $y < 2x + 1$ $m = \frac{2}{1}$
 solid $y \geq -\frac{1}{3}x + 4$ $m = -\frac{1}{3}$

$0 < 2(0) + 1$ (4,0)
 $0 < 1$ True

State the coordinates of a point in the solution set.



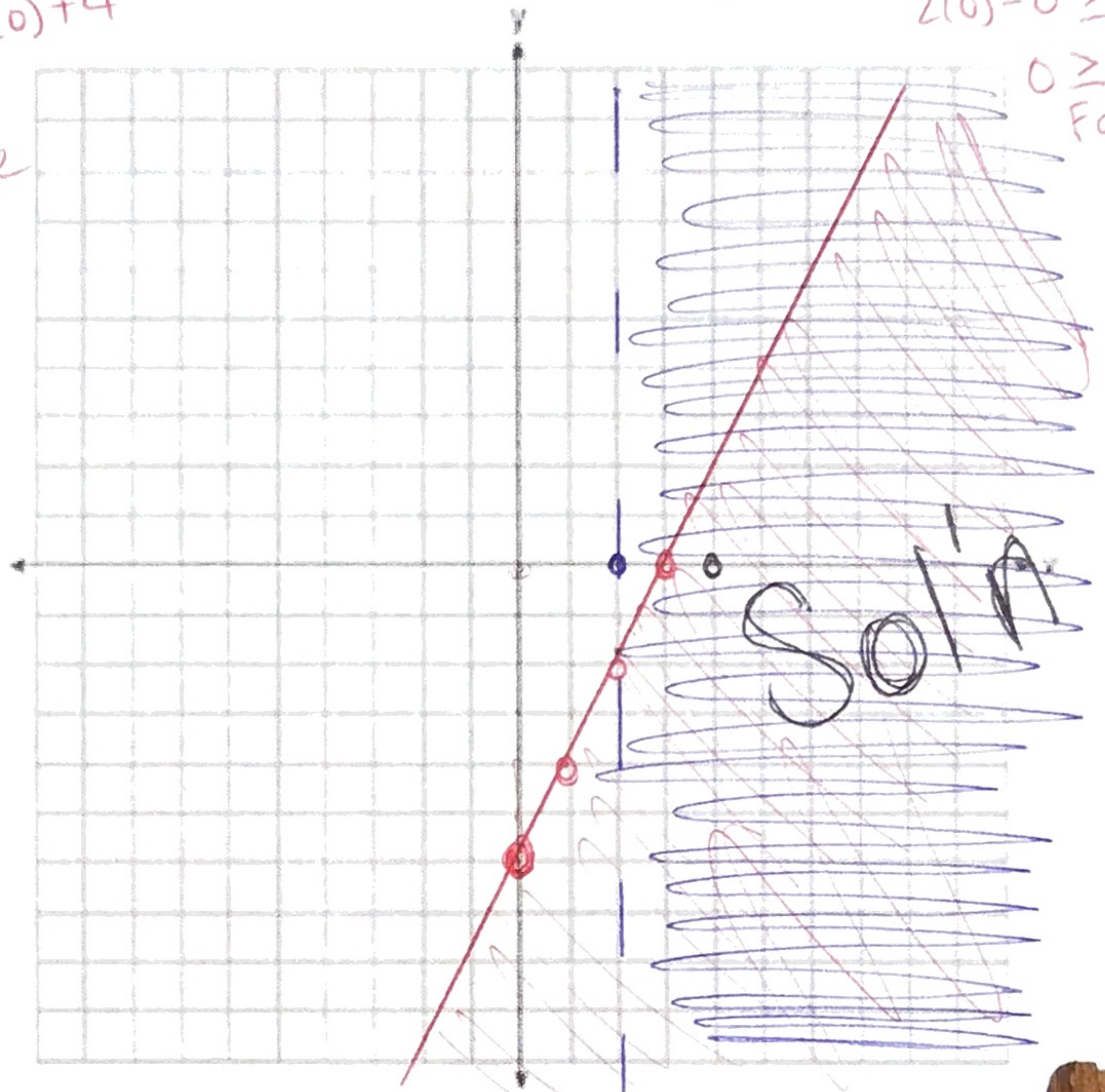
$0 \geq -\frac{1}{3}(0) + 4$
 $0 \geq 4$ False

On the set of axes below, graph the following system of inequalities and state the coordinates of a point in the solution set.

$2x - y \geq 6$
 $-2x - y \geq 6$
 $x > 2$
 dash $y \leq 2x - 6$

$\frac{-y \geq -2x + 6}{-1}$
 $\frac{-y \geq -2x + 6}{-1}$
 $\frac{-y \geq -2x + 6}{-1}$

$2(0) - 0 \geq 6$
 $0 \geq 6$ False

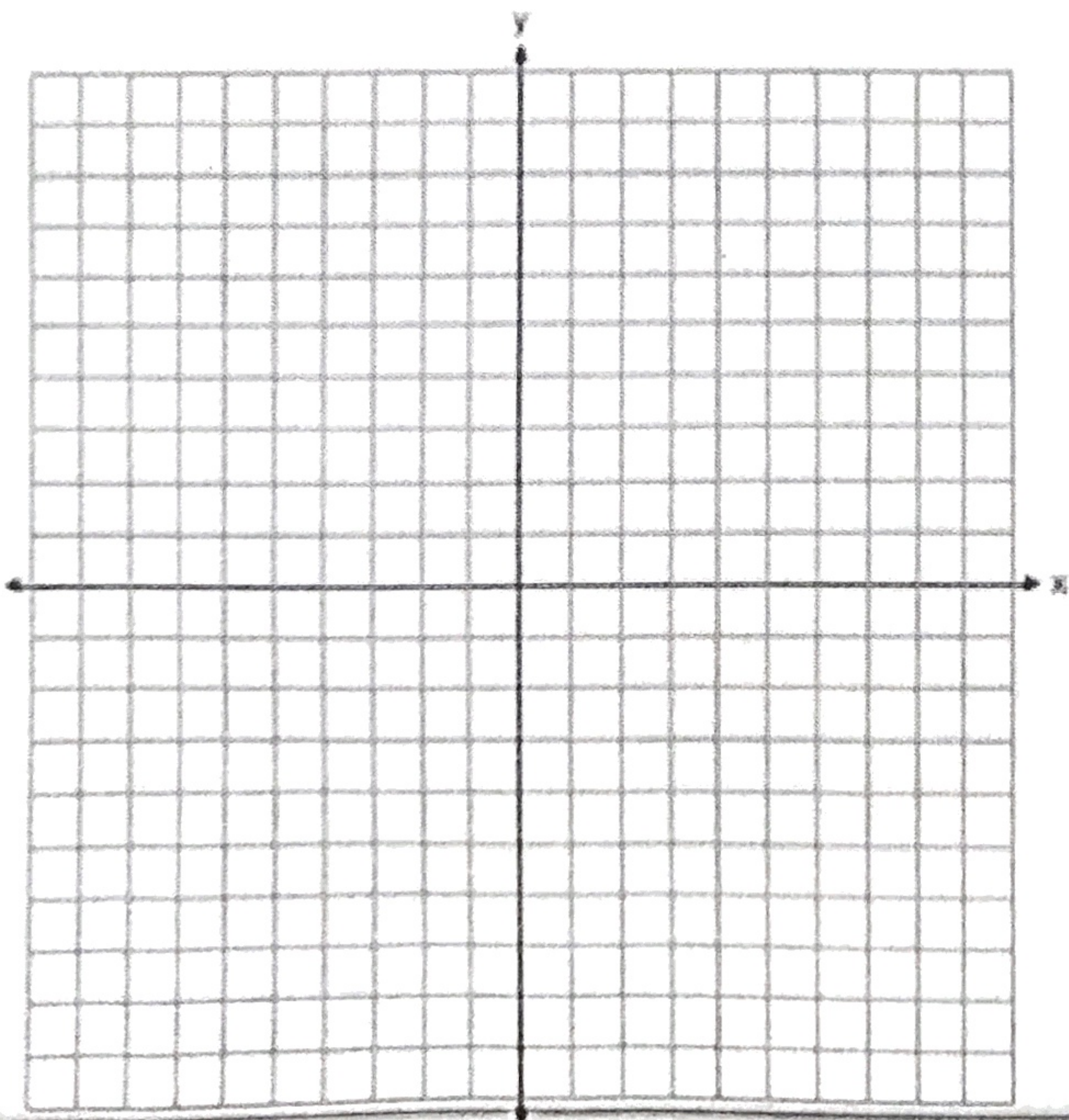


Solve the following system of inequalities graphically on the set of axes below.

$3x + y < 7$

$y \geq \frac{2}{3}x - 4$

State the coordinates of a point in the solution set.



A company manufactures bicycles and skateboards. The company's daily production of bicycles cannot exceed 10, and its daily production of skateboards must be less than or equal to 12. The combined number of bicycles and skateboards cannot be more than 16. If x is the number of bicycles and y is the number of skateboards, graph on the accompanying set of axes the region that contains the number of bicycles and skateboards the company can manufacture daily.

Identify your variables.

x : # of bicycles

y : # of skates

Make your equations system of ineq.

$$\begin{cases} x \leq 10 \\ y \leq 12 \\ x + y \leq 16 \end{cases}$$

Graph on your own paper.