**Math 60, Section 4.10 Notes and Practice** Name: Solutions

**Section 4.10 Linear Inequalities in Two Variables**

1. A couple is planning their wedding. They want the total cost of catering (x, in dollars) and renting the venue (y, in dollars) to be a maximum of $4,000, but they hope to spend less. Write an inequality to model this situation. $y \leq mx+b$ $Ax+By \leq C$ $x+y \leq 4000$

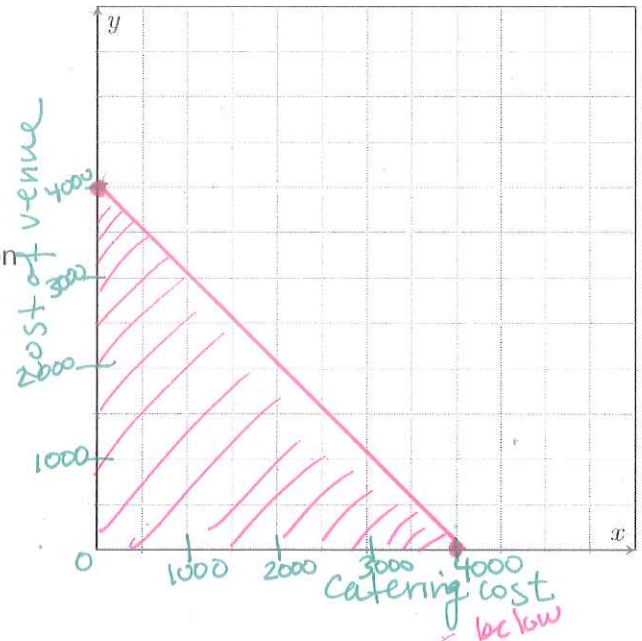
a. Find the x-intercept and y-intercept and graph the inequality. Label the axes and scale.

$x=0$ $y=0$

$0+y \leq 4000$ $x+0=4000$

$y=4000$ $x=4000$

b. Shade all the points that would satisfy their requirement.




c. Solve the inequality for y to put it in slope-intercept form. What does the direction of the inequality tell you about which way to shade on the graph?

$x+y \leq 4000$

$-x \quad -x$

$y \leq -x+4000$

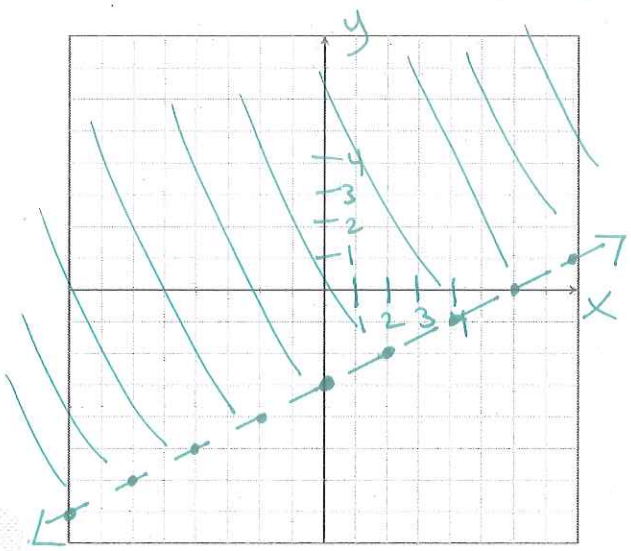
solid

$\leq$ means to shade under the line.

2. a. Graph the linear inequality $y > \frac{1}{2}x - 3$.

dashed? above

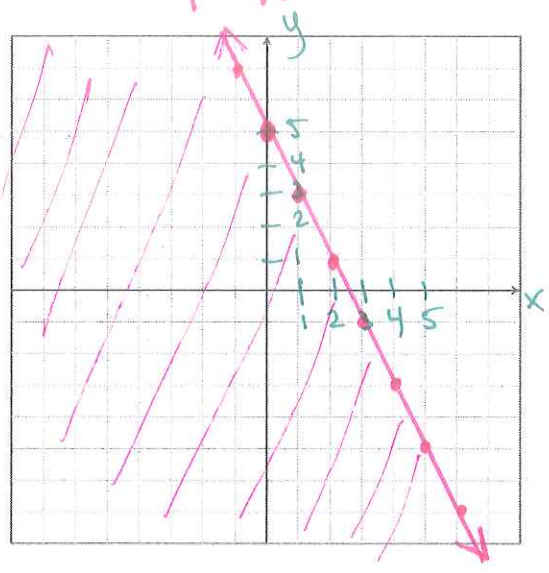
$m=\frac{1}{2}$ $b=-3$




b. Graph the inequality $y \leq -2x+5$

below

$m=-\frac{2}{1}$ $\frac{\text{rise}}{\text{run}}$ solid $b=5$



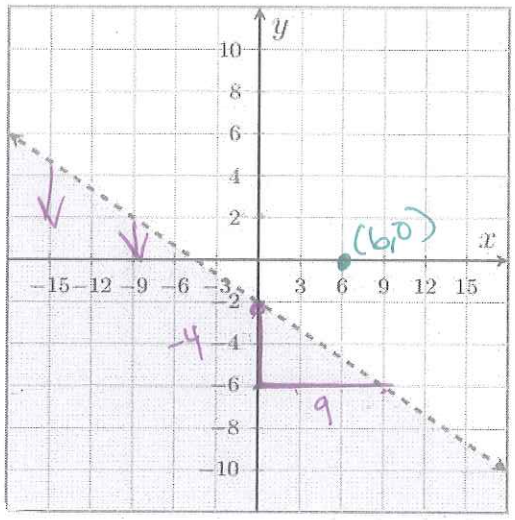
3. Summarize the types of lines and shading for each form of the inequality.

Solve for $y$

| | Type of Line | Direction of Shading |
|---|---|---|
| $y > mx + b$ | dotted | above |
| $y \geq mx + b$ | solid | above |
| $y < mx + b$ | dotted | below |
| $y \leq mx + b$ | solid | below |

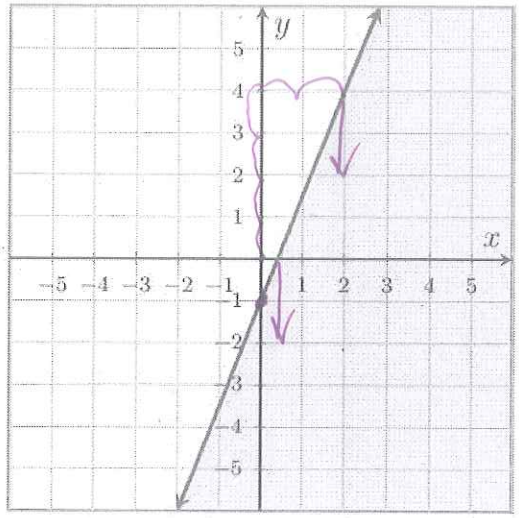
4. Find and state an inequality whose solution set would be the graph shown.

a.




$y < -\frac{4}{9}x - 2$

b.




$y \leq \frac{5}{2}x - 1$

5. a. Is the point (6,0) a solution to the inequality graphed in 4a above? How could you prove this algebraically? no (6,0) is not a solution

(6,0) x y

$y < -\frac{4}{9}x - 2$

$0 \overset{?}{<} -\frac{4}{9} \cdot \frac{6}{1} - 2$

$0 \overset{?}{<} -\frac{8}{3} - \frac{2}{1} \cdot \frac{3}{3}$

$0 \overset{?}{<} -\frac{8}{3} - \frac{6}{3}$

$0 \overset{?}{<} -\frac{14}{3}$

false

$0 \not< -\frac{14}{3}$

b. Is the point (3,-2) a solution of the inequality graphed in 4b above? Prove this algebraically.

$y \leq \frac{5}{2}x - 1$

$-2 \overset{?}{\leq} \frac{5}{2} \cdot \frac{3}{1} - \frac{1}{1}$

$-2 \overset{?}{\leq} \frac{15}{2} - \frac{1}{1} \cdot \frac{2}{2}$

$-2 \overset{?}{\leq} \frac{15}{2} - \frac{2}{2}$

$-2 \leq \frac{13}{2}$ true

(3,-2) is a solution

6. Which points are solutions to the linear inequality $4x-3y\geq 12$?

we could check each point, or graph the inequality to see.

To graph:

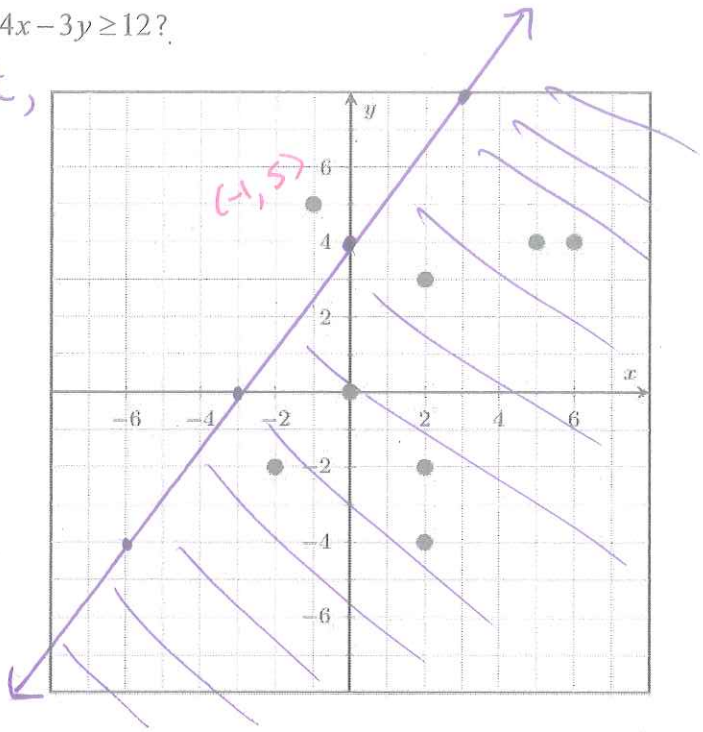
$4x-3y\geq 12$

$-4x \quad -4x$

$\frac{-3y}{-3} \geq \frac{-4x}{-3} - \frac{12}{-3}$

$y \leq \frac{4}{3}x + 4$

Solid line, shade below




All points except (-1,5) are in the shaded area so they are solutions.

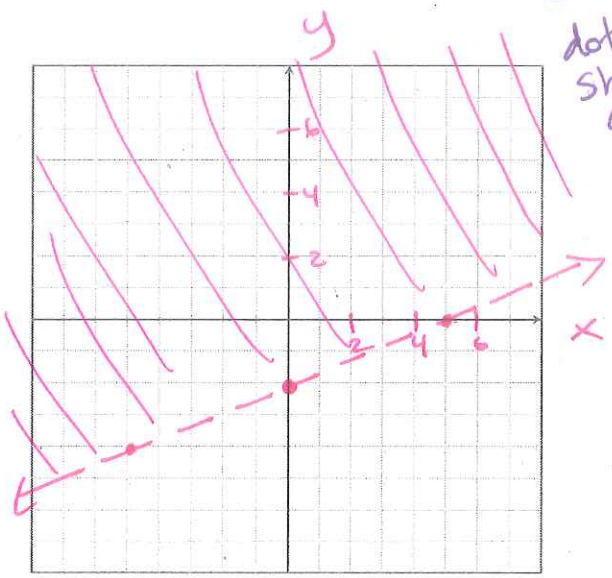
7. a. Graph the linear inequality $2x-5y<10$.

$-2x \quad -2x$

$\frac{-5y}{-5} < \frac{-2x+10}{-5}$

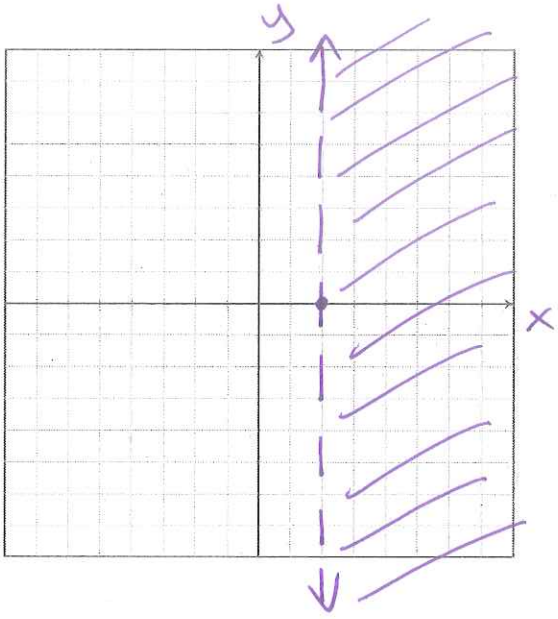
$y > \frac{2}{5}x - 2$

dotted, shade above




b. Graph the inequality $x>-2$

vertical line dotted shade right



More Practice

8. a. Graph the linear inequality $x - y > 4$.

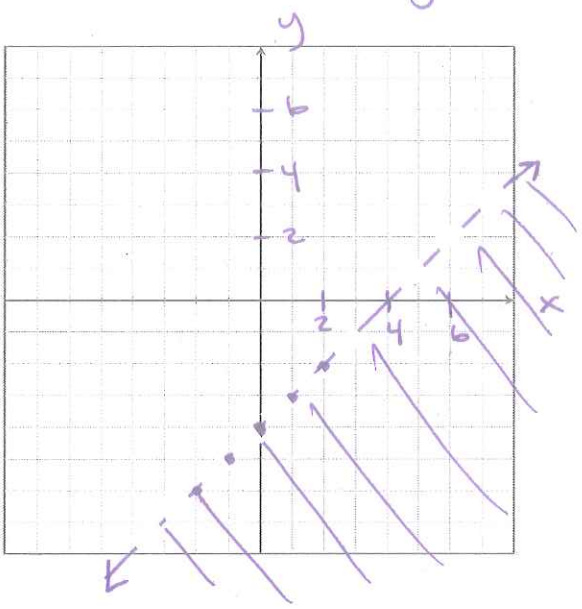
$-x \quad -x$

$-y > -x + 4$

$-1 \quad -1 \quad -1$

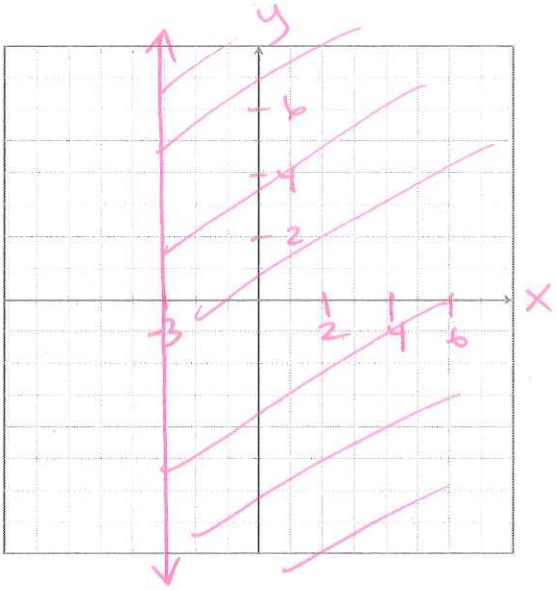
$y < x - 4$

dotted, shade below




b. Graph the inequality $x \geq -3$

vertical line
solid
shade right



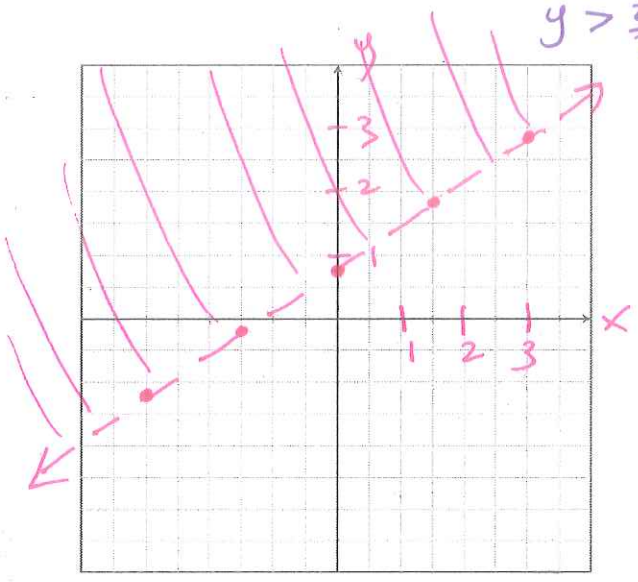

9. a. Graph the linear inequality $2x - 3y < -2$.

$-2x \quad -2x$

$\frac{-3y}{-3} < \frac{-2x}{-3} - \frac{2}{-3}$

$y > \frac{2}{3}x + \frac{2}{3}$

dotted, shade above




b. Graph the inequality $y > 4$

horizontal line
Shade above
dotted