Name _____ Date _____

GOAL **Solve systems of linear inequalities in two variables.**

> ## Vocabulary
>
> A **system of linear inequalities** in two variables, or simply a *system of inequalities*, consists of two or more linear inequalities in the same variables.
>
> A **solution of a system of linear inequalities** is an ordered pair that is a solution of each inequality in the system.
>
> The **graph of a system of linear inequalities** is the graph of all solutions of the system.
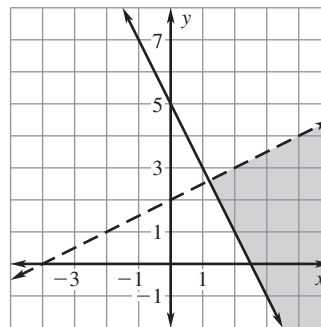
EXAMPLE 1
Graph a system of two linear inequalities

Graph the system of inequalities.

$y < \frac{1}{2}x + 2$ \quad Inequality 1

$y \geq -2x + 5$ \quad Inequality 2

Solution

Graph both inequalities in the same coordinate plane. The graph of the system is the intersection of the two half-planes, which is shown as the shaded region.

CHECK Choose a point in the shaded region, such as (2, 2). To check this solution, substitute 2 for *x* and 2 for *y* into each inequality.

Inequality 1	**Inequality 2**
$y < \frac{1}{2}x + 2$	$y \geq -2x + 5$
$2 \overset{?}{<} \frac{1}{2}(2) + 2$	$2 \overset{?}{\geq} -2(2) + 5$
$2 < 3$ ✓	$2 \geq 1$ ✓

EXAMPLE 2
Graph a system of three linear inequalities

Graph the system of inequalities.

$y \leq 5$	Inequality 1
$x < 4$	Inequality 2
$y \geq -2x + 2$	Inequality 3

Solution

Graph all three inequalities in the same coordinate plane. The graph of the system is the triangular region shown.
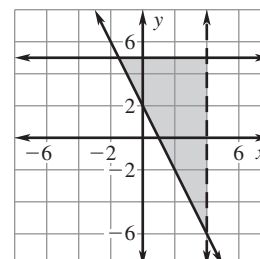
LESSON 6.6

LESSON 6.6 **Study Guide** *continued*
For use with the lesson "Solve Systems of Linear Inequalities"

Exercises for Examples 1 and 2

Graph the system of linear inequalities.

1. $y > 3x - 2$
$y \le \frac{2}{3}x + 1$

2. $x > -2$
$y > -3$
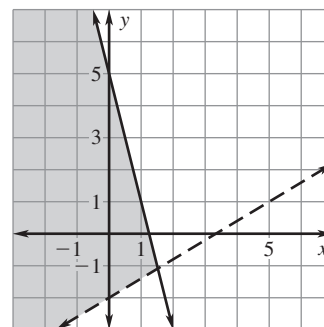$y \le \frac{3}{4}x + 2$

3. $y > 2$
$y < 8$
$y \ge 4x - 1$

EXAMPLE 3 ## Write a system of linear inequalities

Write a system of inequalities for the shaded region.

Solution

Inequality 1 One boundary for the shaded region has a slope of -4 and a y-intercept of 5. So, its equation is $y = -4x + 5$. Because the shaded region is *below* the *solid line*, the inequality is $y \le -4x + 5$.

Inequality 2 Another boundary line for the shaded region has a slope of $\frac{3}{5}$ and a y-intercept of -2. So, its equation is $y = \frac{3}{5}x - 2$. Because the shaded region is *above* the *dashed line*, the inequality is $y > \frac{3}{5}x - 2$.

The system of inequalities for the shaded region is:

$y \le -4x + 5$ Inequality 1

$y > \frac{3}{5}x - 2$ Inequality 2

Exercises for Example 3

Write a system of inequalities that defines the shaded region.

4.

5.

LESSON 6.6