7.6 Solve Linear Systems of Linear Inequalities

Goal • Solve systems of linear inequalities in two variables.

Your Notes

VOCABULARY

System of linear inequalities A system of linear inequalities in two variables consists of two or more linear inequalities in the same variables.

Solution of a system of linear inequalities An ordered pair that is a solution of each inequality in the system

Graph of a system of linear inequalities The graph of all solutions of the system

GRAPHING A SYSTEM OF LINEAR INEQUALITIES

Step 1 Graph each inequality.

Step 2 **Find** the intersection of the graphs. The graph of the system is this intersection.

Your Notes

Example 1 ***Graph a system of three linear inequalities***

Graph the system of inequalities.

$y > 1$ **Inequality 1**

$x \leq 4$ **Inequality 2**

$3y < 6x - 6$ **Inequality 3**

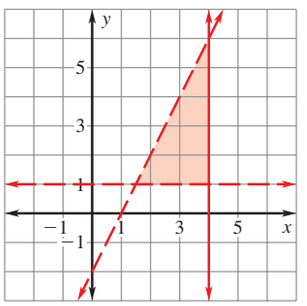
Solution

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

The region is above the line $y = 1$.

The region is on and to the left of the line $x = 4$.

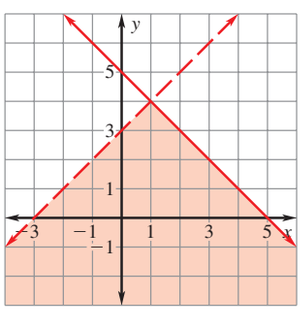
The region is below the line $3y = 6x - 6$.



Checkpoint **Graph the system of linear equations.**

1. $x + y \leq 5$

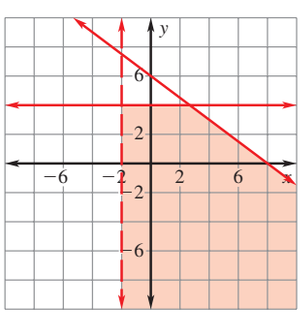
$y < x + 3$



2. $x > -2$

$y \leq 4$

$3x + 4y \leq 24$

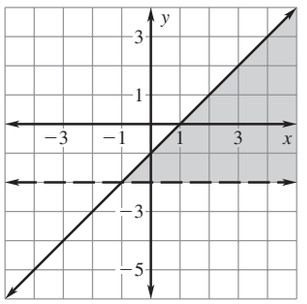


Your Notes

Example 2 ***Write a system of linear inequalities***

Write a system of inequalities for the shaded region.

Solution



Inequality 1 One boundary line for the shaded region is $y = -2$. Because the shaded region is above the dashed line, the inequality is $y > -2$.

Inequality 2 Another boundary line for the shaded region has a slope of 1 and a *y*-intercept of -1. So, its equation is $y = x - 1$. Because the shaded region is below the solid line, the inequality is $y \leq x - 1$.

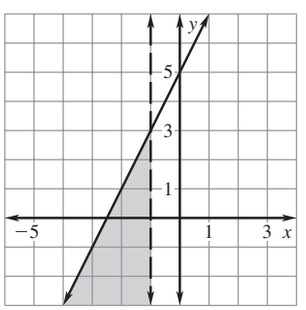
The system of inequalities for the shaded region is:

$y > -2$ **Inequality 1**

$y \leq x - 1$ **Inequality 2**

✔ ***Checkpoint*** **Write a system of inequalities that defines the shaded region.**

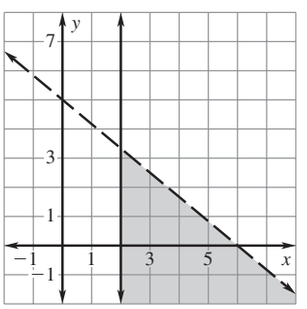
3.



$y \leq 2x + 5$

$x < -1$

4.



$y < -\frac{5}{6}x + 5$

$x \geq 2$

Homework