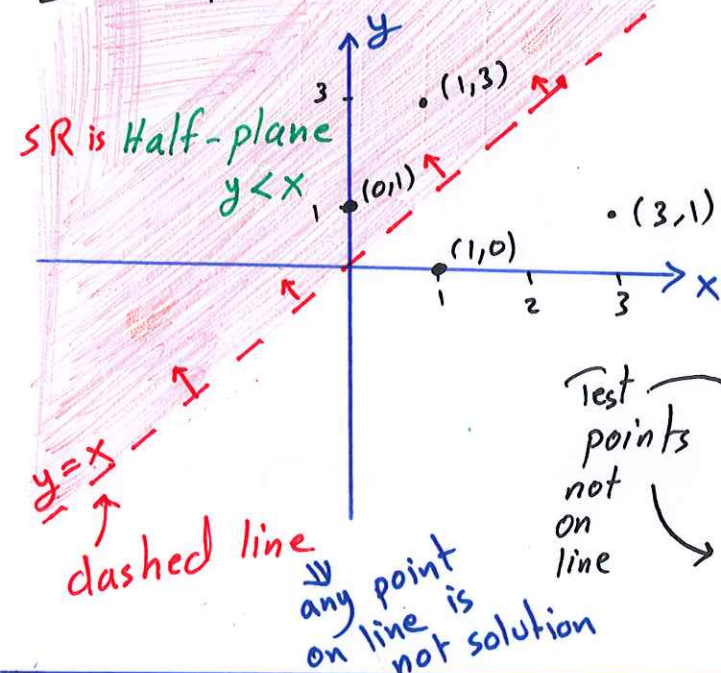


4.1 Linear Inequalities in Two Variables

86

Exp Graph the solution set of the inequality $y > x$



The solution set is the region

$$SR = \{(x, y) : y > x\}$$

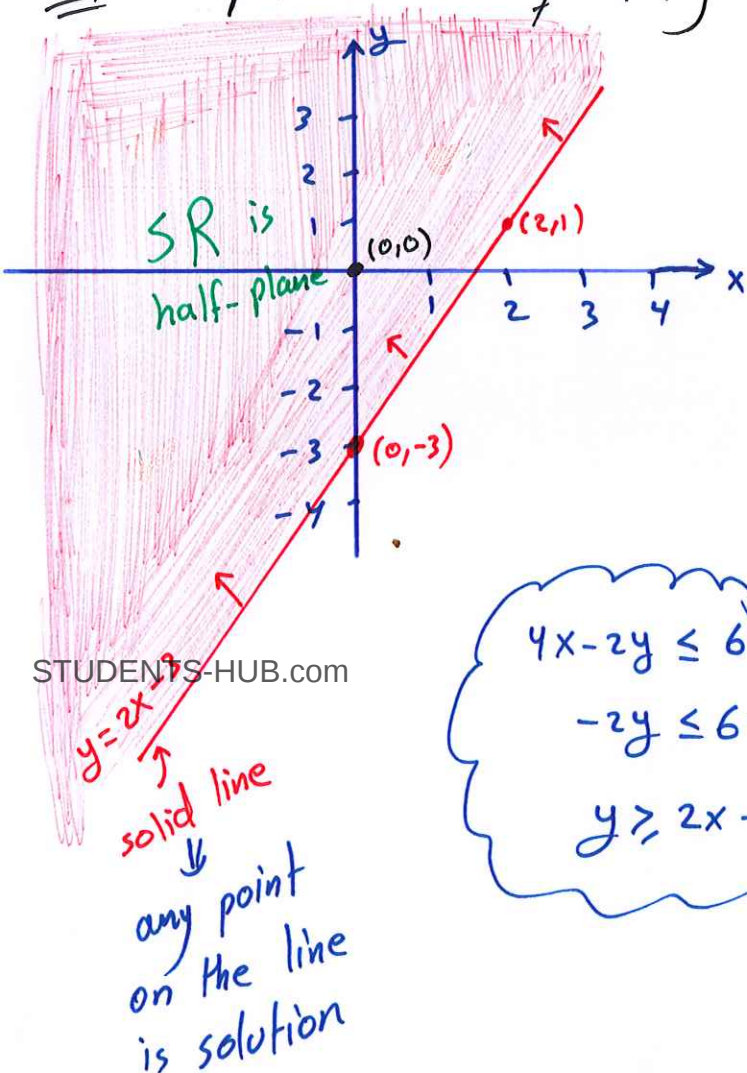
of all pairs (x, y) in which $y > x$

Test points not on line

- $(0, 1), (3, 2), (-1, 0), (-5, -2), \dots$ are solutions of $y > x$

- $(1, 0), (3, 2), \dots$ are not solutions

Exp Graph the inequality $4x - 2y \leq 6$



Draw the line $4x - 2y = 6$

$$\frac{-2y}{-2} = \frac{6-4x}{-2} \Rightarrow$$

$$y = 2x - 3$$

when $x = 0 \Rightarrow y = -3 \Rightarrow (0, -3)$

$x = 2 \Rightarrow y = 1 \Rightarrow (2, 1)$

Test point (not on line)

$(0, 0)$ satisfies $4x - 2y \leq 6$

since $0 - 0 \leq 6 \checkmark$

Hence, solution Region (SR) is half-plane that contains the test point $(0, 0)$

$$\begin{aligned} 4x - 2y &\leq 6 \\ -2y &\leq 6 - 4x \\ y &\geq 2x - 3 \end{aligned}$$

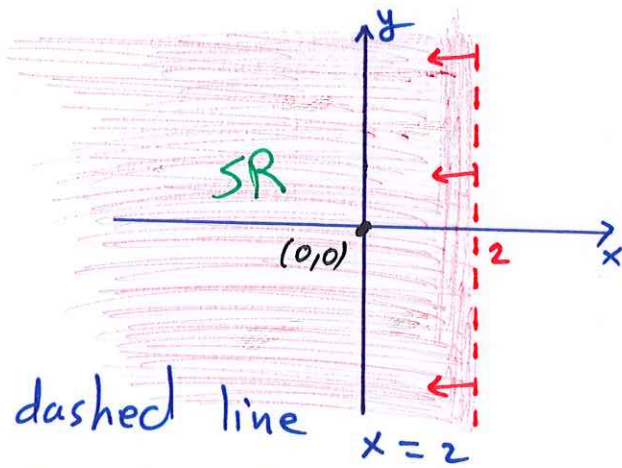
Exp Graph the inequalities: ① $2x - 4 < 0$ ② $0 \geq -6 - 3y$ 87

① $2x - 4 < 0$
 $\quad +4 \quad +4$

$2x < 4$

$x < 2$

- Draw the dashed line $x = 2$
- Test point $(0,0)$ satisfies $2x - 4 < 0$ ✓



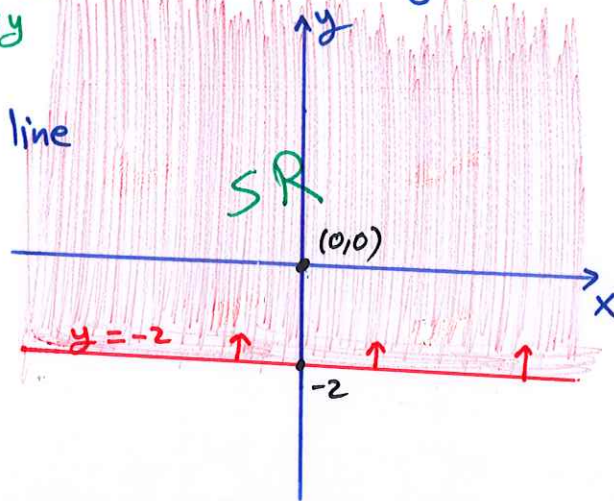
- Any point on the dashed line $x = 2$ is not solution

② $0 \geq -6 - 3y$ $\Rightarrow 3y \geq -6$
 $\quad +3y \quad +3y$

$\Rightarrow$ $y \geq -2$

- Draw the solid line $y = -2$

- Test point $(0,0)$ satisfies $0 \geq -6 - 3y$ ✓



- Any point on the line $y = -2$ is solution

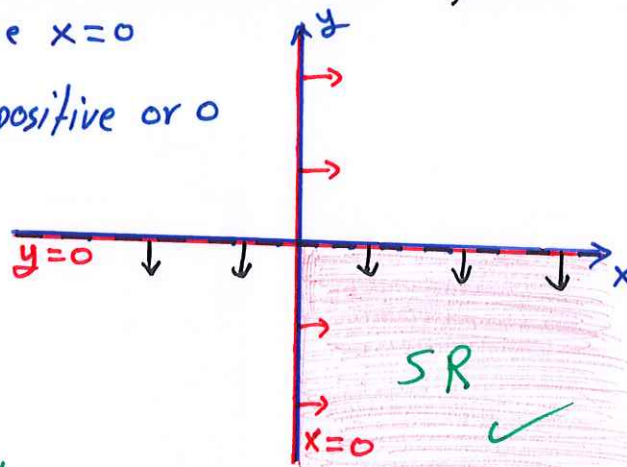
Exp Graph the solution of the system $\begin{cases} x \geq 0 \\ y < 0 \end{cases}$

- Draw the solid line $x = 0$
- $x \geq 0$ means x is positive or 0

- Draw the dashed line $y = 0$

Uploaded by: Jibreel Bornat

STUDENTS-HUB.com



- $y < 0$ means y is negative

SR is the 4th quadrant

- $(0, -1)$, $(2, -3)$, $(1, -10)$, ... are solutions
- $(1, 0)$, $(2, 1)$, $(-1, 2)$, ... are not solutions

Exp Graph the solution of the system $\begin{cases} 3x - 2y \geq 4 \\ x + y - 3 > 0 \end{cases}$

88

• Draw the solid line $3x - 2y = 4$

$$x = 0 \Rightarrow -2y = 4 \Rightarrow y = -2$$

$$x = 2 \Rightarrow 6 - 2y = 4 \Rightarrow -2y = -2 \Rightarrow y = 1$$

• Test point: $(0,0)$ does not satisfy $3x - 2y \geq 4$

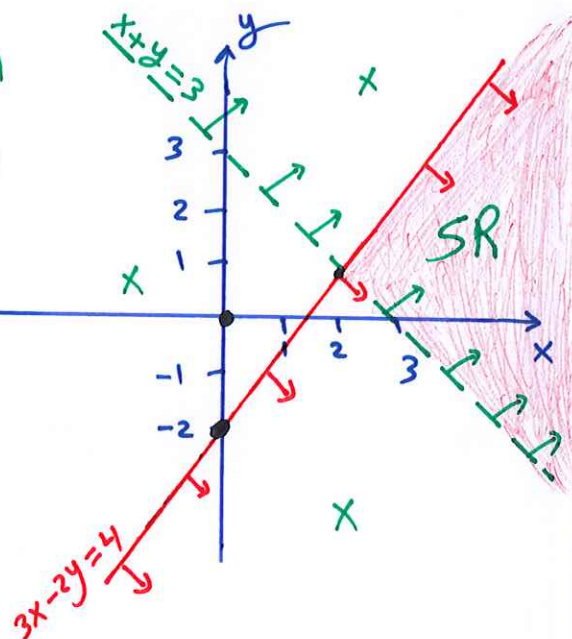
• Draw the dashed line $x + y - 3 = 0$

$$x + y = 3$$

$$x = 0 \Rightarrow y = 3$$

$$x = 3 \Rightarrow y = 0$$

• Test point: $(0,0)$ does not satisfy $x + y - 3 > 0$



• $(3,1), (5,0), (4,4), \dots$ solutions for both inequalities

• $(2,-1), (1,4), (2,1), (1,2), \dots$ not solutions

Exp Graph the solution region (SR) of the system $\begin{cases} 4x + 3y \leq 12 \\ 2x - y \leq 2 \\ x \geq 0, y \geq 0 \end{cases}$

• Draw the solid line $4x + 3y = 12$

$$x = 0 \Rightarrow y = 4$$

$$x = 3 \Rightarrow y = 0$$

• Test point: $(0,0)$ satisfies $4x + 3y \leq 12$

• Draw the solid line $2x - y = 2$

$$x = 0 \Rightarrow y = -2$$

$$x = 1 \Rightarrow y = 0$$

• Test point: $(0,0)$ satisfies $2x - y \leq 2$

• $x \geq 0$ means x is positive or 0

• $y \geq 0$ means y is positive or 0

