

$$1 \quad -3x + 5y \leq 15$$

Step 1. Corresponding equation $\rightarrow -3x + 5y = 15$

Step 2. Domain & Range \rightarrow All real numbers.

Step 3. X-intercept

y-intercept

Plug-in $y=0$ in $-3x + 5y = 15$

plug in $x=0$, in $-3x + 5y = 15$

$$\text{Therefore, } -3x + 5(0) = 15$$

$$\text{Therefore, } -3(0) + 5y = 15$$

$$-3x + 0 = 15$$

$$0 + 5y = 15$$

$$-3x = 15$$

$$5y = 15$$

$$\frac{-3x}{-3} = \frac{15}{-3}$$

$$\frac{5y}{5} = \frac{15}{5}$$

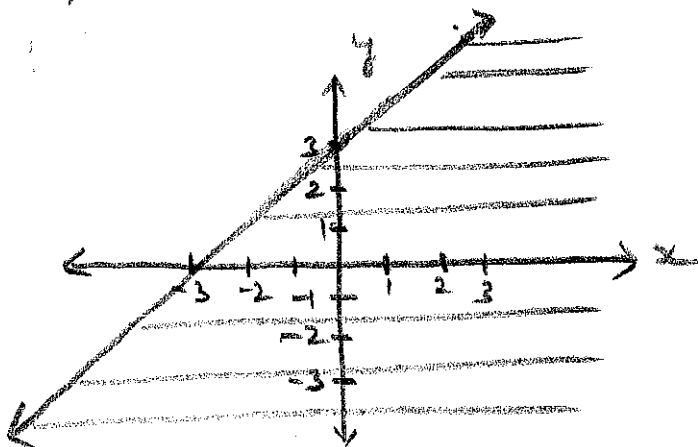
$$x = -3$$

$$y = 3$$

Therefore, x-intercept = $(-3, 0)$

Therefore, y-intercept = $(0, 3)$

Step 4. Sketch the boundary of the solution set using x & y intercepts, and shade the correct half using step 5.



Step 5. Test

$$\text{Plug-in } (0, 0) \text{ in } -3x + 5y \leq 15$$

$$-3(0) + 5(0) \leq 15$$

$$0 + 0 \leq 15$$

$$0 \leq 15$$

True

Therefore, the solution set is on the same side as point $(0, 0)$

Now shade this half plane.

2. Graph the given inequality: $3x + 2y \geq 6$

Step 1. Corresponding equation $\rightarrow 3x + 2y = 6$

Step 2. Domain & Range \rightarrow All real numbers $\rightarrow x \in \mathbb{R}, y \in \mathbb{R}$

Step 3. X-intercept

Plug-in $y=0$ in $3x + 2y = 6$

Therefore, $3x + 2(0) = 6$

$$3x + 0 = 6$$

$$3x = 6$$

$$\frac{3x}{3} = \frac{6}{3}$$

$$x = 2$$

X-intercept = $(2, 0)$

Y-intercept

Plug-in $x=0$ in $3x + 2y = 6$

Therefore, $3(0) + 2y = 6$

$$0 + 2y = 6$$

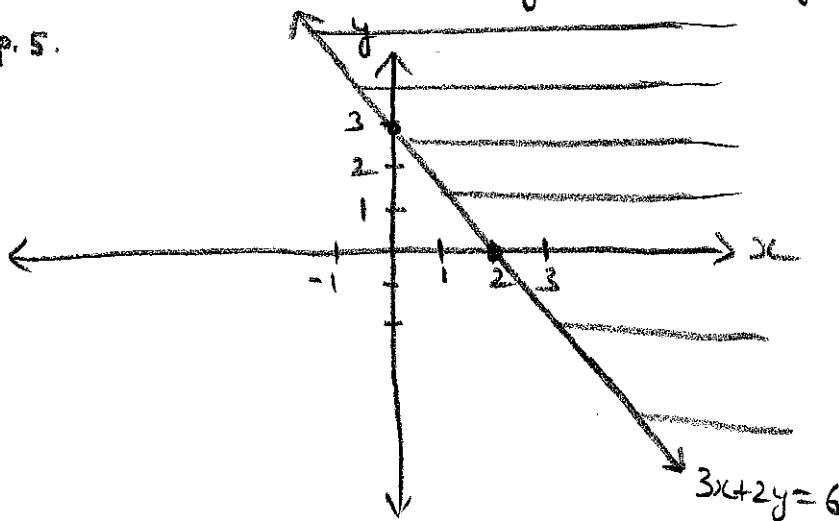
$$2y = 6$$

$$\frac{2y}{2} = \frac{6}{2}$$

$$y = 3$$

Y-intercept = $(0, 3)$

Step 4. Sketch the graph using x and y intercepts, and shade the solution set after doing step 5.



Step 5. Test.

Plug-in, $(0, 0)$ in $3x + 2y \geq 6$
 $3(0) + 2(0) \geq 6$

$$0 + 0 \geq 6$$

$$0 \geq 6$$

False

Therefore, the Sol. set is on the other side of $(0, 0)$

3. $x+2y \geq 8$, $x \in \mathbb{I}$, $y \in \mathbb{I}$

Step 1. Corresponding equation $\rightarrow x+2y=8$

Step 2. Domain & Range \rightarrow All integer $\rightarrow x \in \mathbb{I}$, $y \in \mathbb{I}$

Step 3. X-intercept

plug-in $y=0$ in $x+2y=8$

Therefore $x+2(0)=8$

$$x+0=8$$

$$x=8$$

Therefore, x-intercept $\rightarrow (8,0)$

y-intercept

plug $x=0$ in $x+2y=8$

Therefore, $0+2y=8$

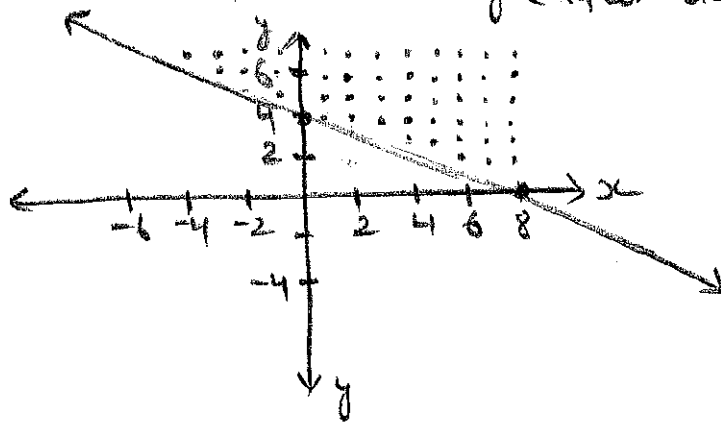
$$2y=8$$

$$\frac{2y}{2} = \frac{8}{2}$$

$$y=4$$

Therefore, y-intercept $\rightarrow (0,4)$

Step 4. Sketch the boundary line using x & y intercepts, and shade the solution set using (after doing) step 5.



Step 5. Test

plug-in $(0,0)$ in $x+2y > 8$

$$0+2(0) > 8$$

$$0+0 > 8$$

$$0 > 8$$

False

Therefore, the solution set is on the other side of $(0,0)$

$$4x + 5y \geq 20$$

$$5x + 2y \leq 10$$

$$4x + 5y \geq 20$$

$$5x + 2y \leq 10$$

- (S1) $4x + 5y = 20$
 (S2) Domain & Range \rightarrow all real numbers

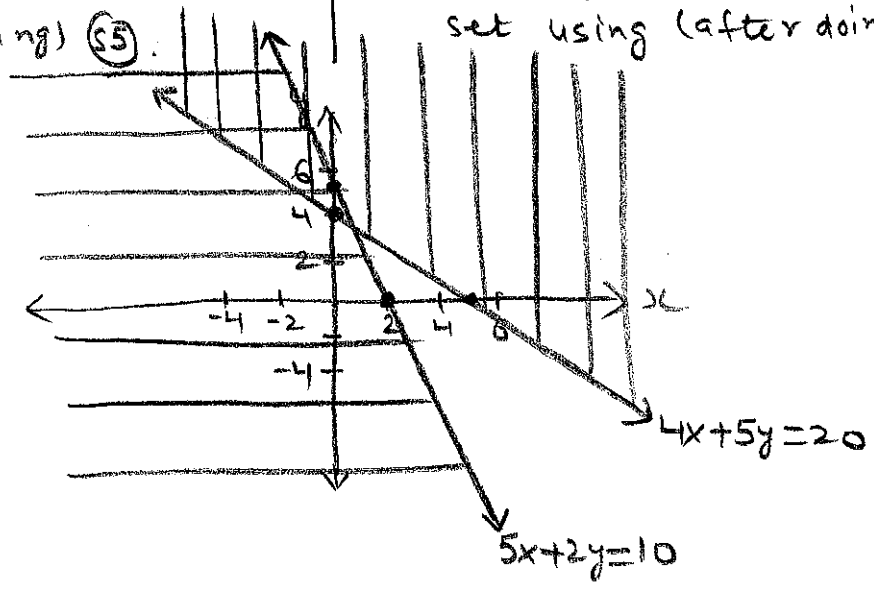
X-intercept	y-intercept
plug-in $y=0$ in $4x+5y=20$	plug-in $x=0$ in $4x+5y=20$
$4x + 5(0) = 20$	$4(0) + 5y = 20$
$4x + 0 = 20$	$0 + 5y = 20$
$4x = 20$	$5y = 20$
$\frac{4x}{4} = \frac{20}{4}$	$\frac{5y}{5} = \frac{20}{5}$
$x = 5$	$y = 4$
X-intercept $(5, 0)$	y-intercept $(0, 4)$

- (S1) $5x + 2y = 10$
 (S2) Domain & Range \rightarrow all real numbers

X-intercept	y-intercept
plug-in $y=0$ in $5x+2y=10$	plug-in $x=0$ in $5x+2y=10$
$5x + 2(0) = 10$	$5(0) + 2y = 10$
$5x + 0 = 10$	$0 + 2y = 10$
$5x = 10$	$2y = 10$
$\frac{5x}{5} = \frac{10}{5}$	$\frac{2y}{2} = \frac{10}{2}$
$x = 2$	$y = 5$
x-intercept $(2, 0)$	y-intercept $(0, 5)$

(S4) sketch the graph using x & y intercepts, but shade the solution set using (after doing) (S5).

(S4) sketch the graph using x & y intercepts, but shade the solution set using (after doing) (S5).



(S5) Test
 plug-in $(0, 0)$ in $4x + 5y \geq 20$
 $4(0) + 5(0) \geq 20$
 $0 + 0 \geq 20$
 $0 \geq 20$
 False
 \therefore The solution set is on the other side of point $(0, 0)$

(S5) Test
 plug-in $(0, 0)$ in $5x + 2y \leq 10$
 $5(0) + 2(0) \leq 10$
 $0 + 0 \leq 10$
 $0 \leq 10$
 True
 Therefore, the solution set is on the same side as point $(0, 0)$

$$4x - 5y \geq 20$$

$$5x - 2y \leq 10$$

$$4x - 5y = 20$$

x-intercept

$$4x - 5(0) = 20$$

$$4x - 0 = 20$$

$$4x = 20$$

$$\frac{4x}{4} = \frac{20}{4}$$

$$x = 5$$

x-intercept $\rightarrow (5, 0)$

y-intercept

$$4(0) - 5y = 20$$

$$0 - 5y = 20$$

$$-5y = 20$$

$$\frac{-5y}{-5} = \frac{20}{-5}$$

$$y = -4$$

y-intercept $\rightarrow (0, -4)$

x-intercept

$$5x - 2(0) = 10$$

$$5x - 0 = 10$$

$$5x = 10$$

$$\frac{5x}{5} = \frac{10}{5}$$

$$x = 2$$

x-intercept $\rightarrow (2, 0)$

y-intercept

$$5(0) - 2y = 10$$

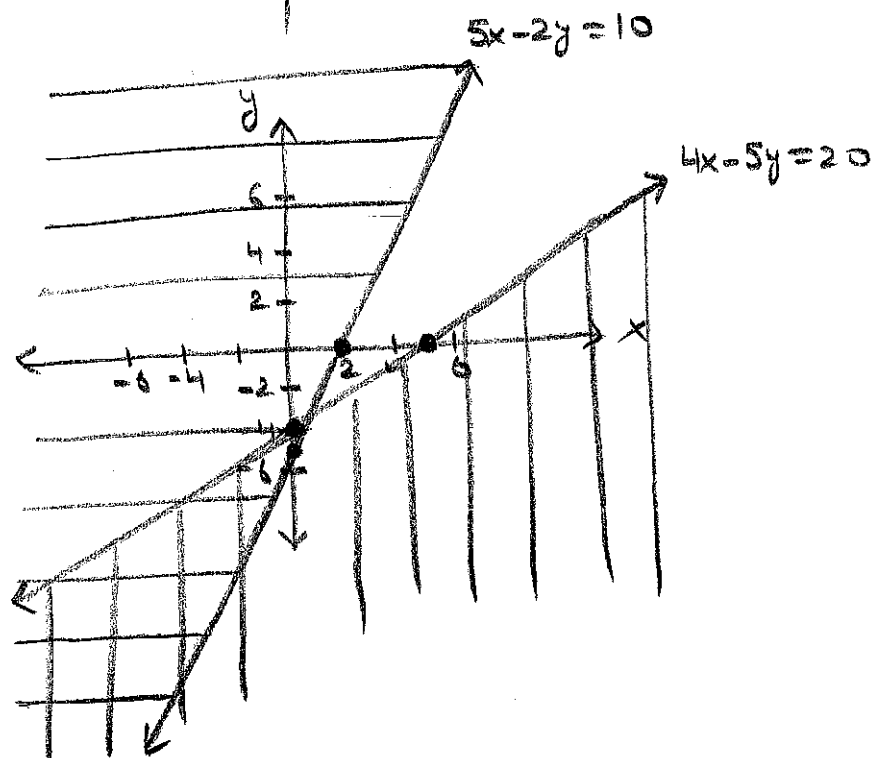
$$0 - 2y = 10$$

$$-2y = 10$$

$$\frac{-2y}{-2} = \frac{10}{-2}$$

$$y = -5$$

y-intercept $\rightarrow (0, -5)$



Test

$$4x - 5y \geq 20$$

$$(0, 0) \rightarrow 4(0) - 5(0) \geq 20$$

$$0 - 0 \geq 20$$

$$0 \geq 20$$

False

The solution set is on the other side of the point $(0, 0)$

Test

$$5x - 2y \leq 10$$

$$(0, 0) \rightarrow 5(0) - 2(0) \leq 10$$

$$0 - 0 \leq 10$$

$$0 \leq 10$$

True

Therefore, the solution set is on the same side as $(0, 0)$

6. $-3x + 2y \geq 6$
 $6x + 5y \leq 12$

$-3x + 2y = 6$

$6x + 5y = 12$

X-intercept
 $-3x + 2(0) = 6$
 $-3x + 0 = 6$
 $-3x = 6$
 $\frac{-3x}{-3} = \frac{6}{-3}$
 $x = -2$

Y-intercept
 $-3(0) + 2y = 6$
 $0 + 2y = 6$
 $2y = 6$
 $\frac{2y}{2} = \frac{6}{2}$
 $y = 3$

X-intercept
 $6x + 5(0) = 12$
 $6x + 0 = 12$
 $6x = 12$
 $\frac{6x}{6} = \frac{12}{6}$
 $x = 2$

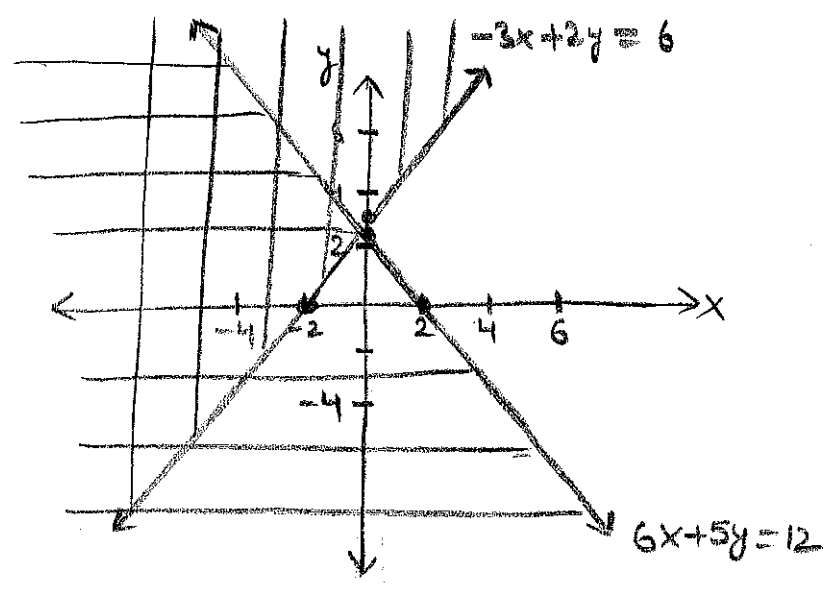
Y-intercept
 $6(0) + 5y = 12$
 $0 + 5y = 12$
 $5y = 12$
 $\frac{5y}{5} = \frac{12}{5}$
 $y = 2.4$

X-intercept $(-2, 0)$

Y-intercept $(0, 3)$

X-intercept $(2, 0)$

Y-intercept $(0, 2.4)$



Test

$(0, 0) \rightarrow -3x + 2y \geq 6$
 $-3(0) + 2(0) \geq 6$
 $0 + 0 \geq 6$
 $0 \geq 6$

False

Therefore, the solution set is on the other side of the point $(0, 0)$

Test

$(0, 0) \rightarrow 6x + 5y \leq 12$
 $6(0) + 5(0) \leq 12$
 $0 + 0 \leq 12$
 $0 \leq 12$

True

Therefore, the solution set is on the same side as point $(0, 0)$