

Section 1.2

⑪ $5x - \frac{1}{3}y \leq 6$

Multiply by 3: $15x - y \leq 18$

$$-y \leq -15x + 18$$

Divide by -1
Inequality reverses

$$y \geq 15x - 18$$

⑮ $x=2, y=1 \rightarrow$

$$3x + 5y \leq 12$$
$$6 + 5 \leq 12 \quad ?$$
$$11 \leq 12 \quad ?$$

YES

⑰ $x=3, y=0 \rightarrow$

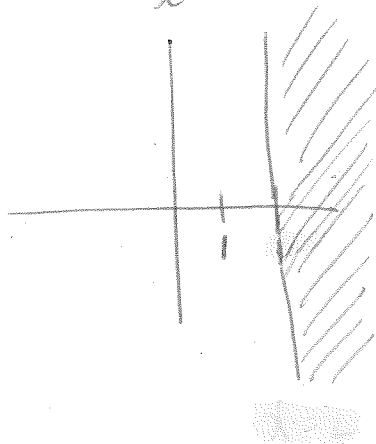
$$y \geq -2x + 7$$
$$0 \geq -6 + 7 \quad ?$$
$$0 \geq 1$$

No

(19) $x=3, y=5 \rightarrow y \leq 3x-4$
 $5 \leq 9-4$?
 $5 \leq 5$?
YES

(21) $x=7, y=-2 \rightarrow x \geq 5$
 $7 \geq 5$?
YES

(29) Graph $x \geq 2$
 $x=2$ (vertical line)



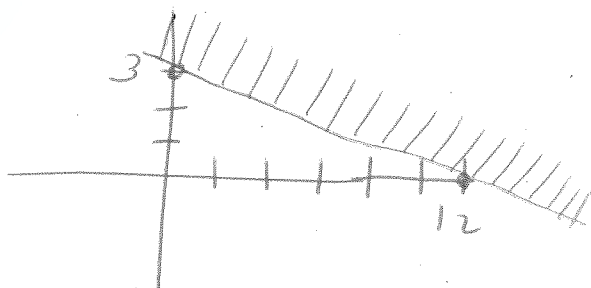
Test $(0,0)$: False

(31)

Graph $x + 4y \geq 12$

$$x + 4y = 12$$

Intercepts: $(0, 3)$
 $(12, 0)$



Test $(0, 0)$: FALSE

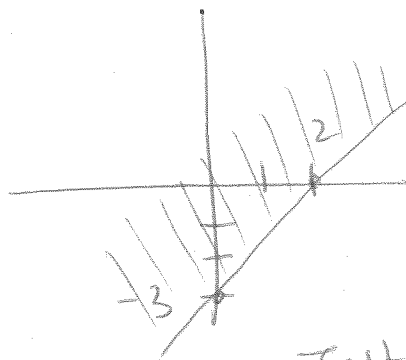
(35)

Graph $\frac{1}{2}x - \frac{1}{3}y \leq 1$

$$\frac{1}{2}x - \frac{1}{3}y = 1$$

Intercepts: $x=0 \rightarrow -\frac{1}{3}y = 1$
 $y = -3$ $(0, -3)$

$y=0 \rightarrow \frac{1}{2}x = 1$
 $x = 2$ $(2, 0)$



Test $(0, 0)$: TRUE

(37)

Graph
 $0.5x + 0.4y \leq 2$

$$0.5x + 0.4y = 2$$

Intercepts: $x=0 \rightarrow 0.4y = 2$

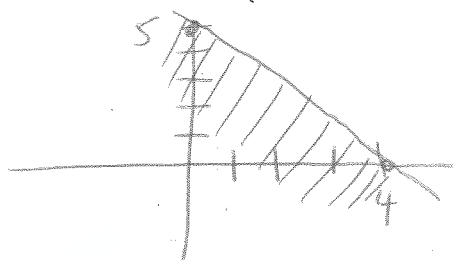
$$4y = 20$$

$$y = 5 \quad (0, 5)$$

$y=0 \rightarrow 0.5x = 2$

$$5x = 20$$

$$x = 4 \quad (4, 0)$$



Test $(0, 0)$: TRUE

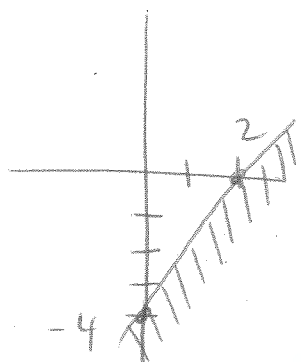
(39)

$$\begin{cases} y \leq 2x - 4 \\ y \geq 0 \end{cases}$$

$$y \leq 2x - 4$$

$$y = 2x - 4$$

Intercepts: $(0, -4)$
 $(2, 0)$

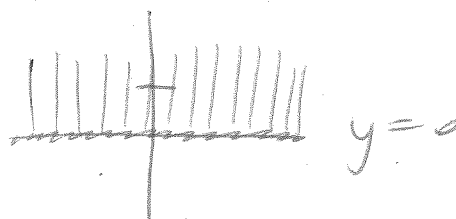


Test $(0, 0)$:

$0 \leq -4$ FALSE

$$y \geq 0$$

$y = 0$ (horizontal line)

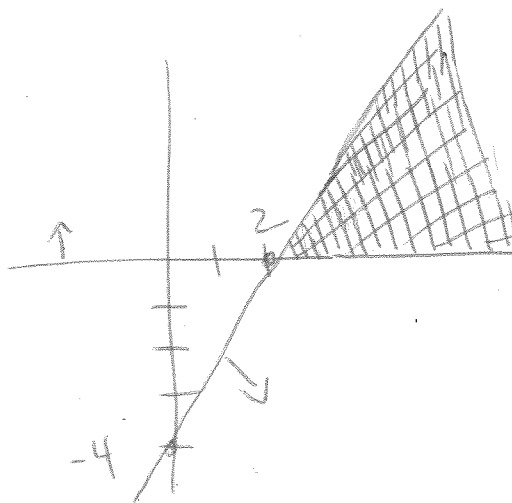


Test any point not on the line, say $(0, 1)$.

Test $(0, 1)$: TRUE

So include the side that contains $(0, 1)$.

All together:



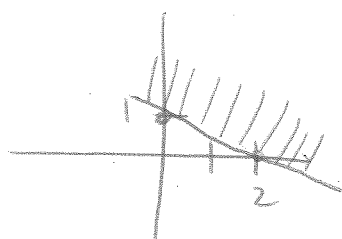
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$$\begin{cases} x+2y \geq 2 \\ 3x-y \geq 3 \end{cases}$$

$$x+2y \geq 2$$

$$x+2y = 2$$

Intercepts: $(0, 1)$
 $(2, 0)$

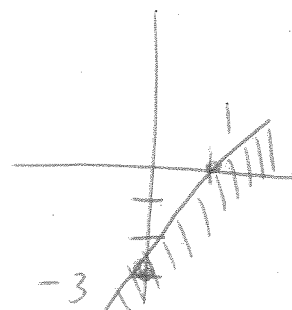


Test $(0, 0)$: FALSE

$$3x-y \geq 3$$

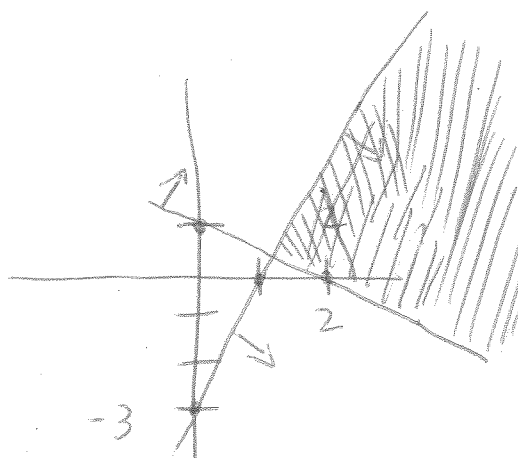
$$3x-y = 3$$

Intercepts: $(0, -3)$
 $(1, 0)$



Test $(0, 0)$: FALSE

All together:

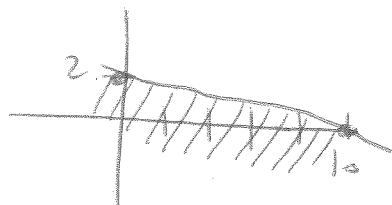


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$$\begin{cases} x + 5y \leq 10 \\ x + y \leq 3 \\ x \geq 0, y \geq 0 \end{cases}$$

$$\begin{aligned} x + 5y &\leq 10 \\ x + 5y &= 10 \end{aligned}$$

Intercepts: (0, 2)
(10, 0)

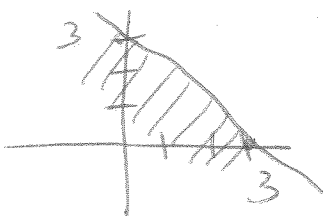


Test (0, 0): TRUE

$$x + y \leq 3$$

$$x + y = 3$$

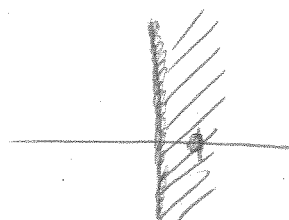
Intercepts: (0, 3)
(3, 0)



Test (0, 0): TRUE

$$x \geq 0$$

$x = 0$ (vertical line)

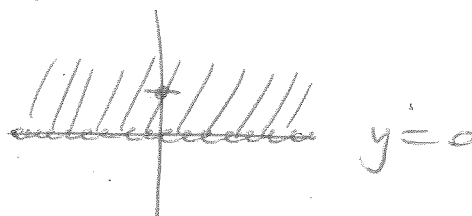


$$x = 0$$

Test (1, 0): TRUE

$$y \geq 0$$

$y = 0$ (horizontal line)



Test (0, 1): TRUE

All together:

