

ANSWERS to Chapter 3 Review:

p. 211, #27, 28

27) $P = -x + y$

28) $(0,0)$ $(-1,2)$ $(-2,6)$

$Q(2,3) \rightarrow 1$

$R(4,2) \rightarrow -2$

$S(3,0) \rightarrow -3 \rightarrow D$

$P(0,2) \rightarrow 2$

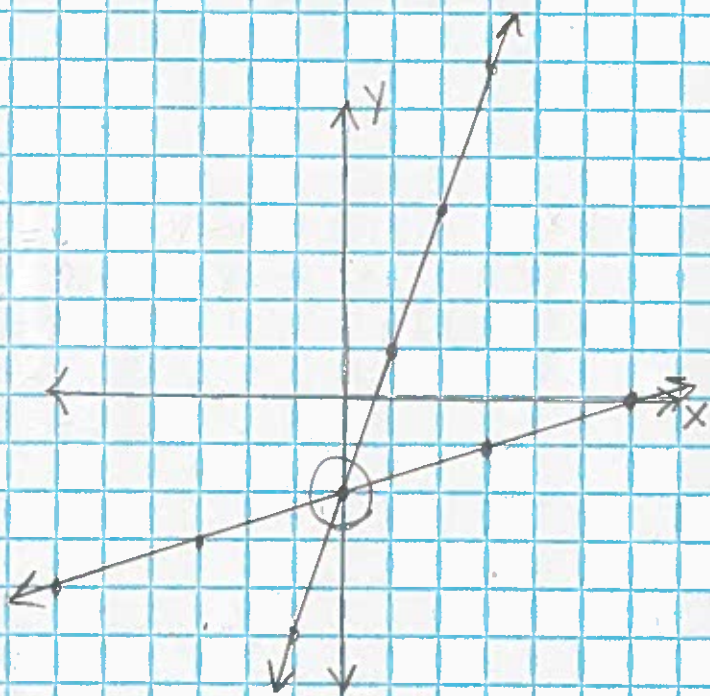
A

p. 232, #9, 10, 17, 22, 23, 30, 34

9)
$$\begin{cases} x - 3y = 6 \rightarrow -3y = -x + 6 \\ 3x - y = 2 \rightarrow \end{cases}$$

$$\begin{aligned} y &= \frac{1}{3}x - 2 \\ -y &= -3x + 2 \\ y &= 3x - 2 \end{aligned}$$

$(0, -2)$



10) $y = x - 7$

$x + 9y = 16 \rightarrow 9y = -x + 16$
 $y = -\frac{1}{9}x + \frac{16}{9}$

**Independent, consistent
one solution**

17)
$$\begin{cases} 4x - y = 0 \rightarrow -y = -4x \\ 6x - 3y = 12 \end{cases}$$

$$\begin{aligned} y &= 4x \\ 6x - 3(4x) &= 12 \\ 6x - 12x &= 12 \\ -6x &= 12 \\ x &= -2 \end{aligned}$$

$$\begin{aligned} y &= 4(-2) \\ y &= -8 \end{aligned}$$

$(-2, -8)$

$$22) \begin{cases} 9x - 5y = 13 \\ 4x - 6y = 2 \end{cases} \cdot 4 \rightarrow -36x + 20y = -52$$

$$9x - 5(1) = 13$$

$$9x - 5 = 13$$

$$9x = 18$$

$$x = 2$$

$$\begin{matrix} 36x - 54y = 18 \\ \underline{-36x + 20y = -52} \\ -34y = -34 \\ y = 1 \end{matrix}$$

$$y = 1$$

$$(2, 1)$$

$$23) \begin{cases} x + y = 80 \\ 1.50x + 4y = 200 \end{cases}$$

$$\rightarrow y = -x + 80$$

$$1.50x + 4(-x + 80) = 200$$

$$1.5x - 4x + 320 = 200$$

$$-2.5x = -120$$

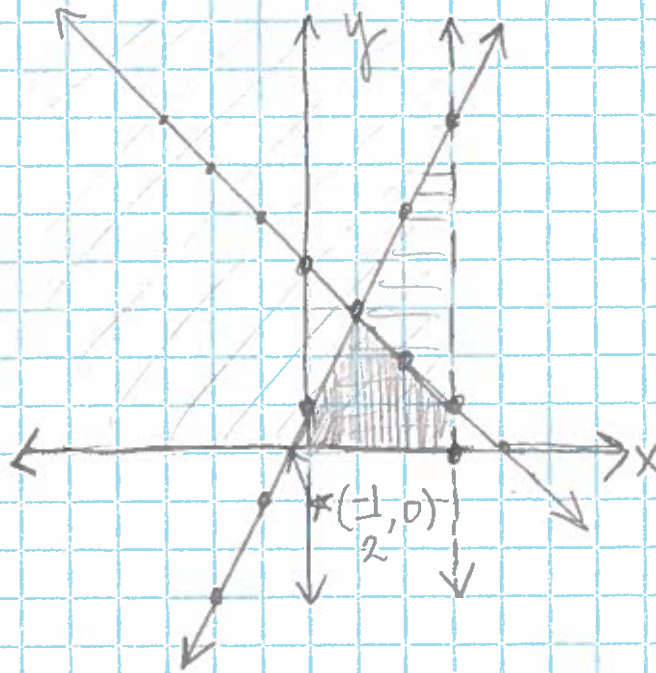
x → pine needles
y → lavender

$$x = 48 \text{ oz of pine needles}$$

$$y = -48 + 80$$

$$y = 32 \text{ oz of lav.}$$

$$30) \begin{cases} x \geq 3 \\ y \geq 0 \\ y \leq 2x + 1 \\ y \leq -x + 4 \end{cases}$$



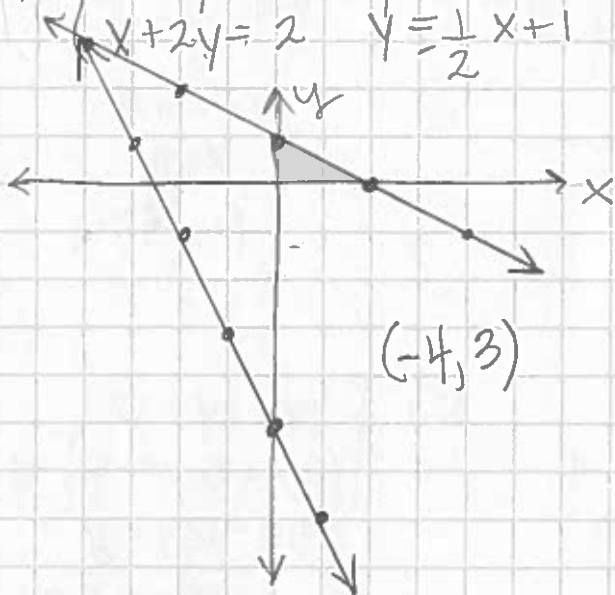
$$34) P = 14x + 9y \text{ (min)}$$

$$\begin{matrix} (-\frac{1}{2}, 0) \rightarrow -7 \\ (3, 0) \rightarrow 42 \\ (3, 1) \rightarrow 51 \\ (0, 1) \rightarrow 9 \\ (1, 3) \rightarrow 41 \end{matrix}$$

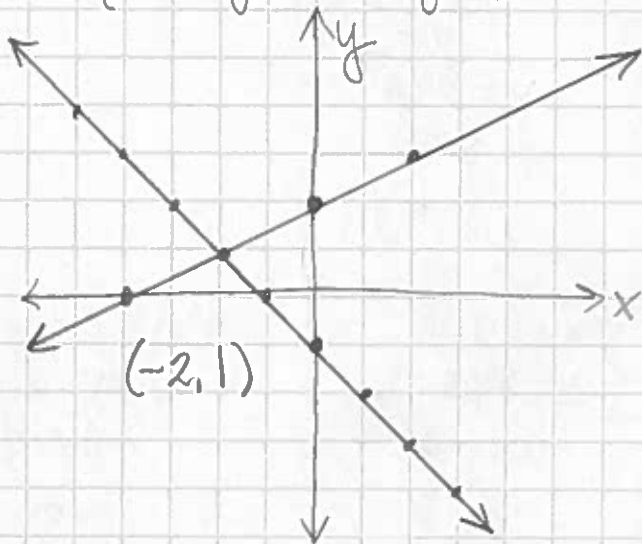
Answers to Chapter 3 Review:

p. 213, #1-19

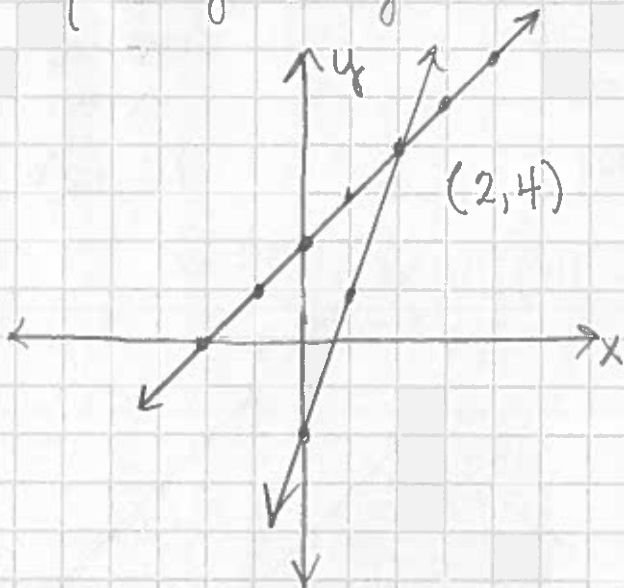
$$1) \begin{cases} 2x+y=-5 & y=-2x-5 \\ x+2y=2 & y=\frac{1}{2}x+1 \end{cases}$$



$$2) \begin{cases} x+y=-1 & y=-x-1 \\ x-2y=-4 & y=\frac{1}{2}x+2 \end{cases}$$



$$3) \begin{cases} x=y-2 & y=x+2 \\ 3x-y=2 & y=3x-2 \end{cases}$$



$$4) \begin{cases} 8x-12y=48 \rightarrow -12y=-8x+48 \\ 3y=2x-4 \rightarrow y=\frac{2}{3}x-\frac{4}{3} \end{cases}$$

Inconsistent, (ind.), no solution

$$5) \begin{cases} 5x-6y=14 \rightarrow -6y=-5x+14 \\ x+3y=15 \rightarrow 3y=-x+15 \end{cases}$$

Independent, consistent, one solution

$$b) \begin{cases} x=2y-10 \rightarrow 2y=x+10 \\ y=5+\frac{1}{2}x & y=\frac{1}{2}x+5 \end{cases}$$

Consistent, dependent
inf. many sol.
 $(x, \frac{1}{2}x+5)$

$$7) \begin{cases} y = x + 3 \\ 2x + 4y = 24 \end{cases}$$

$$\begin{aligned} 2x + 4(x + 3) &= 24 \\ 2x + 4x + 12 &= 24 \\ 6x + 12 &= 24 \\ 6x &= 12 \\ x &= 2 \\ y &= 2 + 3 \\ y &= 5 \\ (2, 5) \end{aligned}$$

$$8) \begin{cases} x = 5 \\ 2x + 3y = 19 \end{cases}$$

$$\begin{aligned} 2(5) + 3y &= 19 \\ 10 + 3y &= 19 \\ 3y &= 9 \\ y &= 3 \\ (5, 3) \end{aligned}$$

$$9) \begin{cases} x - y = 5 \rightarrow x = y + 5 \\ 3x - 2y = 14 \end{cases}$$

$$\begin{aligned} 3(y + 5) - 2y &= 14 \\ 3y + 15 - 2y &= 14 \\ y + 15 &= 14 \\ y &= -1 \\ x &= -1 + 5 \\ x &= 4 \\ (4, -1) \end{aligned}$$

$$10) \begin{cases} x + 2y = 15 \\ x - 2y = -9 \end{cases}$$

$$\begin{aligned} 2x &= 6 \\ x &= 3 \\ 3 + 2y &= 15 \\ 2y &= 12 \\ y &= 6 \\ (3, 6) \end{aligned}$$

$$11) \begin{cases} 5x - 4y = 0 \\ (8x - 4y = 12) - 1 \\ \hline -8x + 4y = -12 \end{cases}$$

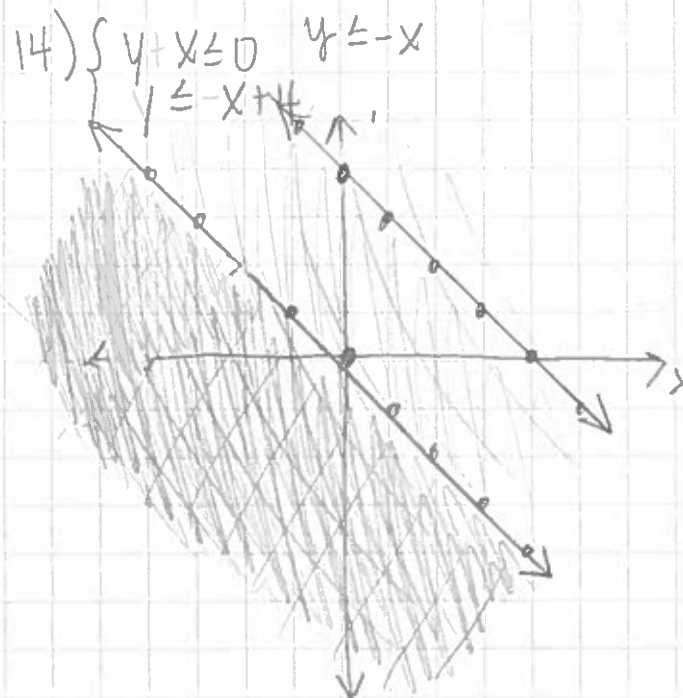
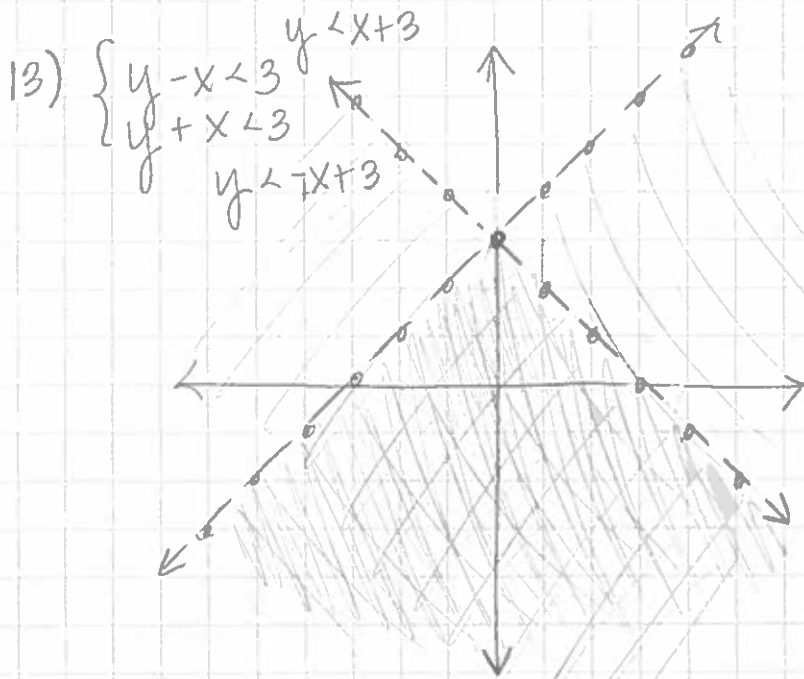
$$\begin{aligned} -3x &= -12 \\ x &= 4 \end{aligned}$$

$$\begin{aligned} 5(4) - 4y &= 0 \\ 20 - 4y &= 0 \\ -4y &= -20 \\ y &= 5 \\ (4, 5) \end{aligned}$$

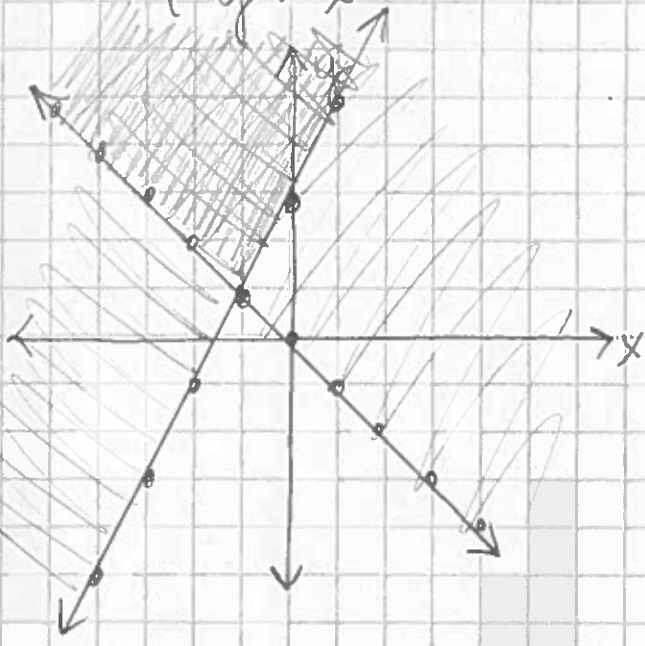
$$12) \begin{cases} 4x + 2y = 12 \\ (2x + 6y = -4) - 2 \\ \hline -4x - 12y = 8 \end{cases}$$

$$\begin{aligned} -10y &= 20 \\ y &= -2 \end{aligned}$$

$$\begin{aligned} 4x + 2(-2) &= 12 \\ 4x - 4 &= 12 \\ 4x &= 16 \\ x &= 4 \\ (4, -2) \end{aligned}$$



$$15) \begin{cases} y \geq 2x + 3 \\ y > -x \end{cases}$$

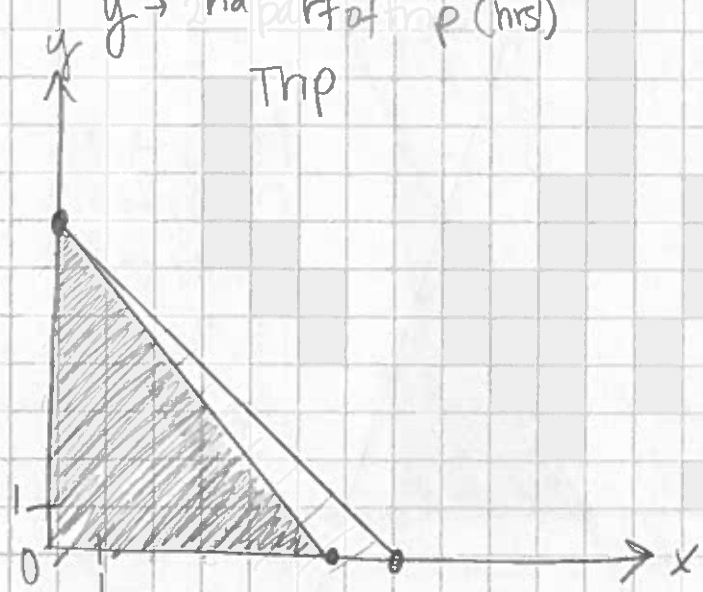


$$16) \begin{cases} 60x + 50y < 3500 \\ x + y < 7 \end{cases}$$

$$\begin{matrix} \text{X int} & \text{Y int} \\ 60x = 3500 & 50y = 3500 \\ x = 5.83 & y = 7 \end{matrix}$$

$x \rightarrow$ 1st part of trip (hrs)
 $y \rightarrow$ 2nd part of trip (hrs)

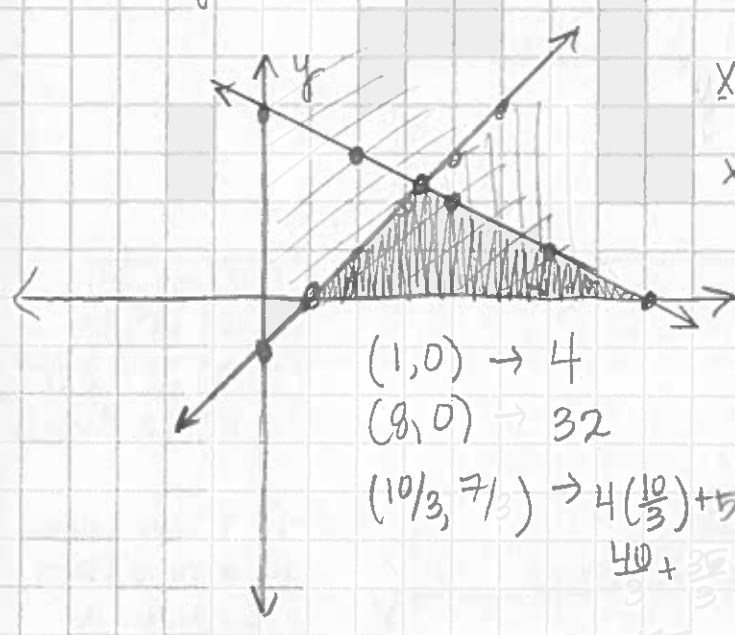
hrs for 2nd part



Trip

of hrs for 1st part

$$17) \begin{cases} x \geq 0 \\ y \geq 0 \\ y \leq x - 1 \\ y \leq -\frac{1}{2}x + 4 \end{cases}$$



$$x - 1 = -\frac{1}{2}x + 4$$

$$x - 5 = -\frac{1}{2}x$$

$$-5 = -\frac{3}{2}x$$

$$-10 = -3x$$

$$x = \frac{10}{3}$$

$$(1, 0) \rightarrow 4$$

$$(8, 0) \rightarrow 32$$

$$(10/3, 7/3) \rightarrow 4(\frac{10}{3}) + 5(\frac{7}{3})$$

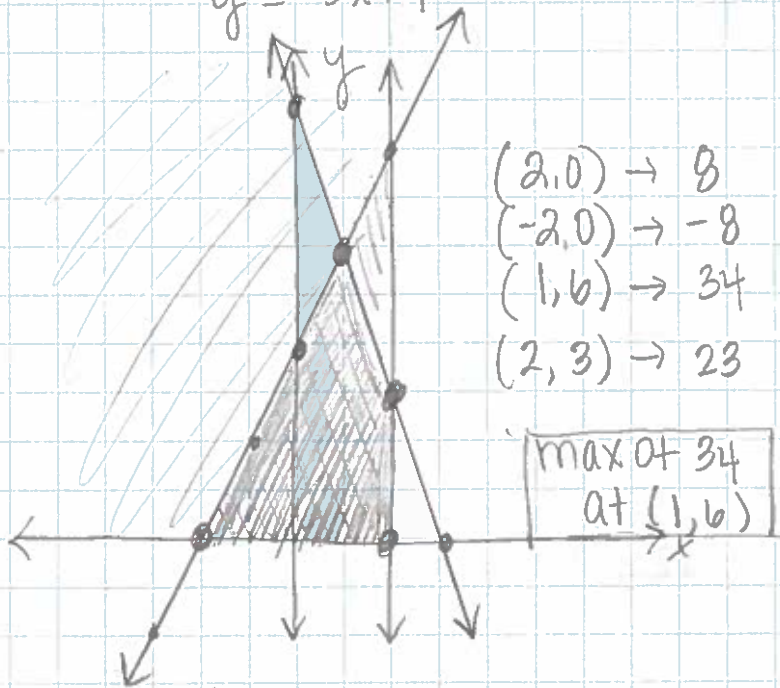
$$y = \frac{10}{3} - 1$$

$$y = \frac{7}{3}$$

$$\frac{40}{3} + \frac{35}{3} = 25$$

min of 4
at (1, 0)

18)
$$\begin{cases} x \leq 2 \\ y \geq 0 \\ y \leq 2x + 4 \\ y \leq -3x + 9 \end{cases}$$



- $(2, 0) \rightarrow 8$
- $(-2, 0) \rightarrow -8$
- $(1, 6) \rightarrow 34$
- $(2, 3) \rightarrow 23$

max of 34
at $(1, 6)$

19) Haircuts 30 min (1/2 hr) $C \rightarrow \$20$
Special 1 hour $C \rightarrow \$45$
 ≤ 4

≤ 8 hrs

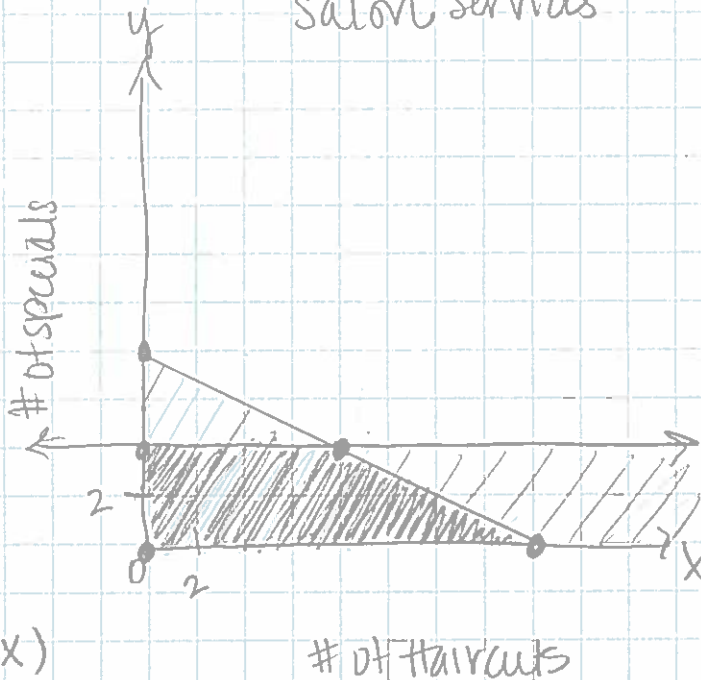
$x \rightarrow$ # of haircuts
 $y \rightarrow$ # of specials

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ \frac{1}{2}x + y \leq 8 \\ y \leq 4 \end{cases}$$

Obj. Function

$I = 20x + 45y$ (max)

Salon services



- $(0, 0) \rightarrow \$0$
- $(0, 4) \rightarrow \$180$
- $(8, 0) \rightarrow \$320$
- $(4, 4) \rightarrow \$340$

To make a max income of \$340, schedule 8 haircuts and 4 specials.

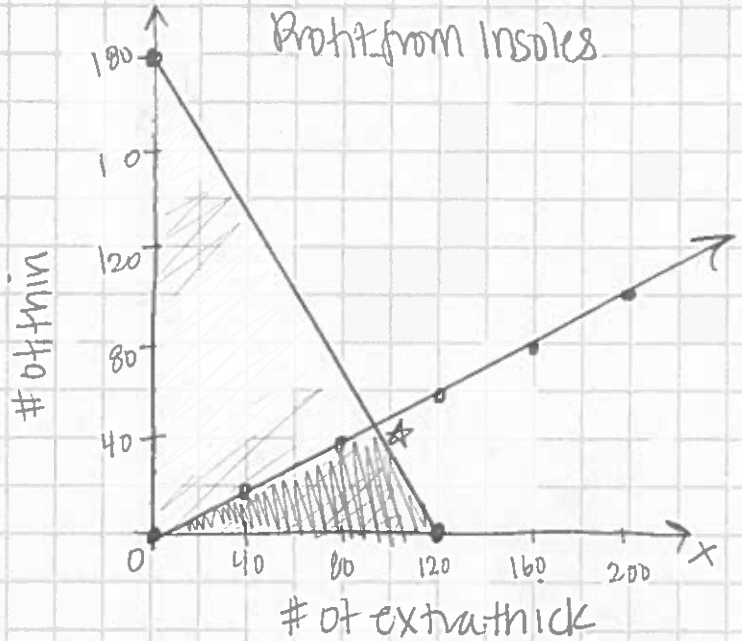
p. 234, # 35-37

35) extra thick 6 min $P \rightarrow \$8$
 thinner 4 min $P \rightarrow \$9$
 720 min

$x \rightarrow$ # of extrathick
 $y \rightarrow$ # of thin

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ 6x + 4y \leq 720 \\ x \geq 2y \end{cases} \rightarrow \frac{1}{2}x \geq y \rightarrow y \leq \frac{1}{2}x$$

x int $(120, 0)$
 y int $(0, 180)$



36) $P = 8 \quad 9y$

37) $(0, 0) \rightarrow \$0$
 $(120, 0) \rightarrow \$960$
 $(90, 45) \rightarrow \$125$

$$6x + 4\left(\frac{1}{2}x\right) = 720$$

$$6x + 2x = 80$$

$$8x = 720$$

$$x = 90$$

$$y = \frac{1}{2}(90) = 45$$

max profit of \$125
 by manufacturing
 90 extrathick
 45 thin

