CHECK Your Understanding

1. Baskets of fruit are being prepared to sell.
   - Each basket contains at least 5 apples and at least 6 oranges.
   - Apples cost 20¢ each, and oranges cost 35¢ each. The budget allows no more than $7, in total, for the fruit in each basket.

   Answer each part below to create a model that could be used to determine the combination of apples and oranges that will result in the maximum number of pieces of fruit in a basket.

   a) What are the two variables in this situation? Describe any restrictions.

   b) Write a system of linear inequalities to represent each constraint:
      i) the number of apples in each basket
      ii) the number of oranges in each basket
      iii) the cost of each basket ~~(in cents)~~

   c) Graph the system.

   d) Write the objective function that represents how the quantity to be maximized relates to the variables.

a) $x \to$ # of apples
$y \to$ # of oranges
$x \in W$
$y \in W$

b) i) $x \geq 5$
ii) $y \geq 6$
iii) $20x + 35y \leq 700$
$\boxed{0.20x + 0.35y \leq 7}$

$Max = x + y$

$0.20x + 0.35y = 7$

x-int

$\frac{0.20x}{0.2} + \cancel{0.35(0)} = \frac{7}{0.2}$

$x = 35$

$(35, 0)$

y-int

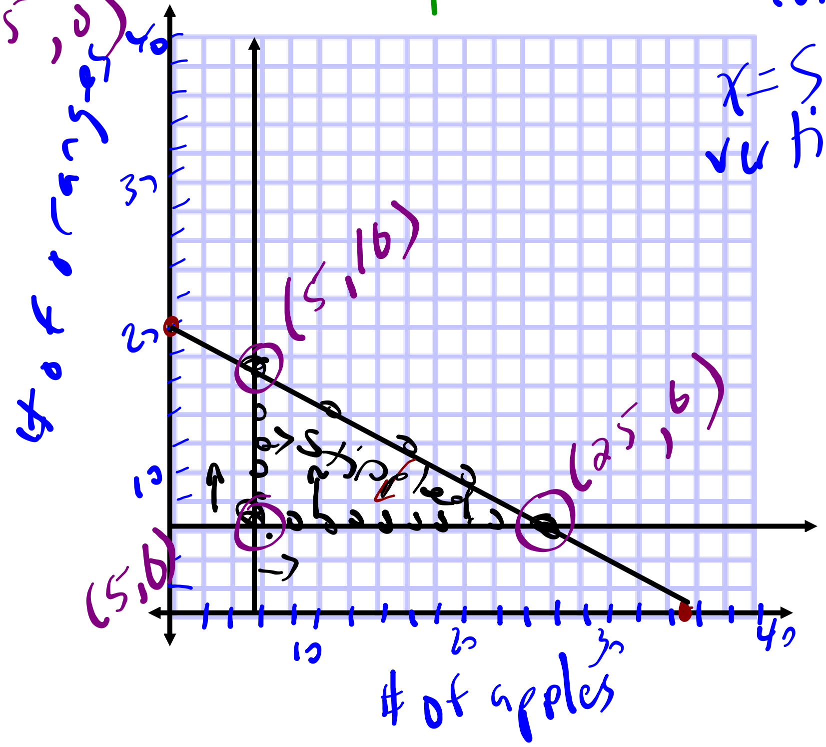
$\cancel{0.20(0)} + \frac{0.35y}{0.35} = \frac{7}{0.35}$

$y = 20$

$(0, 20)$

$x = 5$ vertical

$y = 6$ horizontal



3. A vending machine sells juice and pop.
- The machine holds, at most, 240 cans of drinks.
- Sales from the vending machine show that at least 2 cans of juice are sold for each can of pop. juice depends on pop
- Each can of juice sells for \$1.00, and each can of pop sells for \$1.25.

Create a model that could be used to determine the maximum revenue from the vending machine.

$x \rightarrow$ # of pop sold $x \in W$

$y \rightarrow$ # of juice sold $y \in W$

Constraints:

$x + y \leq 240$ $y \geq 2x$

Graph

$\boxed{y = 2x}$

Objective:

Max $= 1.25x + 1.00y$

Solution

$x + y = 240$

x-int $\rightarrow (240, 0)$

y-int $\rightarrow (0, 240)$

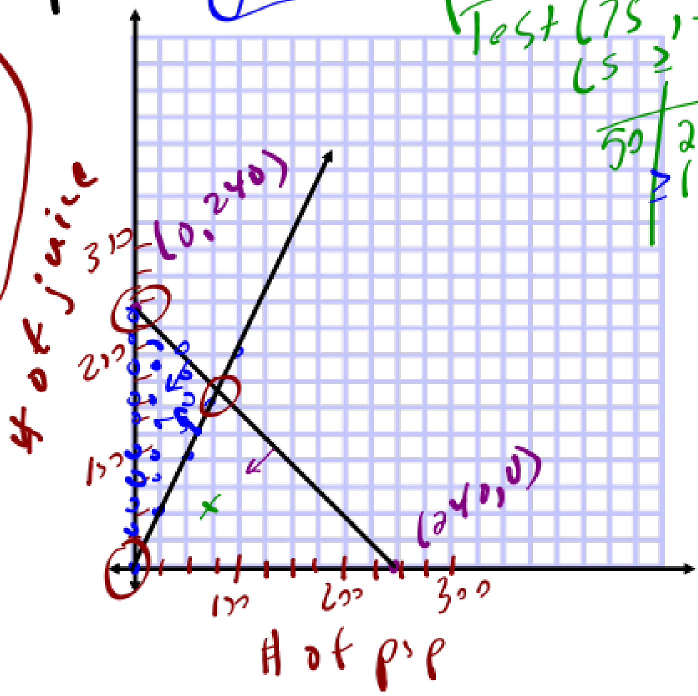
Test $(75, 50)$

LS $\geq$ RS

$50 \mid 2(75)$

≥ 150

No



EXAMPLE of an OPTIMIZATION Problem...

Mick and Keith make MP3 covers to sell, using beads and stickers.

- At most, 45 covers with stickers and 55 bead covers can be made per day.
- Mick and Keith can make 45 or more covers, in total, each day.
- It costs $0.75 to make a cover with stickers, $1.00 to make one with beads.

Let x represent the number of covers with stickers and let y represent the number of bead covers.

Let C represent the cost of making the covers.

RESTRICTIONS: $x \in W$ $y \in W$

CONSTRAINTS: $x \le 45$ $y \le 55$ $x + y \ge 45$ GRAPH

OBJECTIVE FUNCTION: $C = 0.75x + 1.00y$

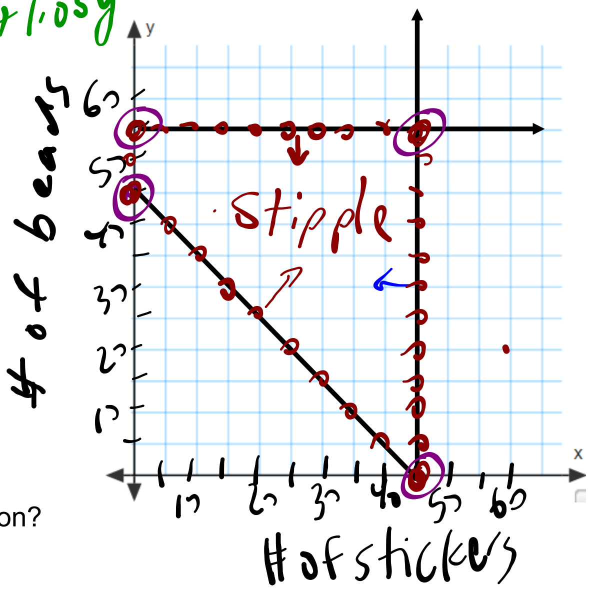
a) Graph the solution set.

$x + y = 45$

x int → (45, 0)

y-int → (0, 45)

$x = 45$ $y = 55$



(corners of overlap)

b) What are the vertices of the feasible region?

(0, 45) (45, 0)

(0, 55) (45, 55)

c) Which point would result in the maximum value of the objective function?

(45, 55)

d) Which point would result in the minimum value of the objective function?

(45, 0)

sub

vertex	objective: $C = 0.75x + 1.00y$
(0, 45)	45
(0, 55)	55
Min (45, 0)	33.75
Max (45, 55)	88.75

To determine the Max or Min...

***substitute your vertices into the objective and decide the max or min solution!

HOMEWORK...

p. 252: #1 - 3

p. 248: #4 - 6