Linear Programming
Practice WS #4

Name Baxter Key

Level C

A sports equipment company makes stationary bicycles and rowing machines. On a given day, the company can make no more than 110 pieces. The cost to produce a bicycle is $75: a rower, $125. The company can spend no more than $10,000 per day on production. Profit on each bicycle is $125 and profit on each rower is $200.

a. Identify the variables:

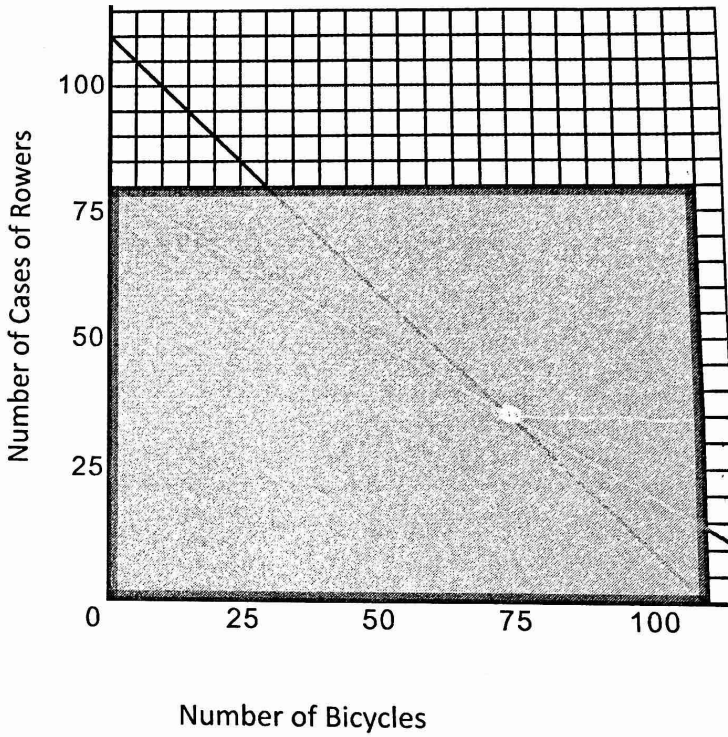
x = # of Bicycles
y = # of Rowers

b. Write an objective function for the profit:

$125x + 200y = P$

c. List the vertices and find the profit

Vertex	Profit
(0,0)	$0
(110,0)	13750
(0,80)	16000
(75,35)	16375



Constraints:

Total Production: $x + y \leq 300$

Cost: $75x + 125y \leq 10{,}000$

d. Make a recommendation for the company (how many of each should they produce and what is their maximum profit)

75 bicycles and 35 Rowers for a profit of $16,375

Chang~ cold

Level B

A café sells cold sandwiches and hot entrees. The minimum and maximum number of entrees the café produces is given in the table below. The café has never sold more than a total of 100 sandwiches and entrees combined in one day. The café makes a profit of $0.75 on each sandwich and $1 on each hot entrée.

Menu Item	Minimum Sold	Maximum Sold
Cold Sandwich	40	60
Hot Entrees	40	60

a. Define the variables

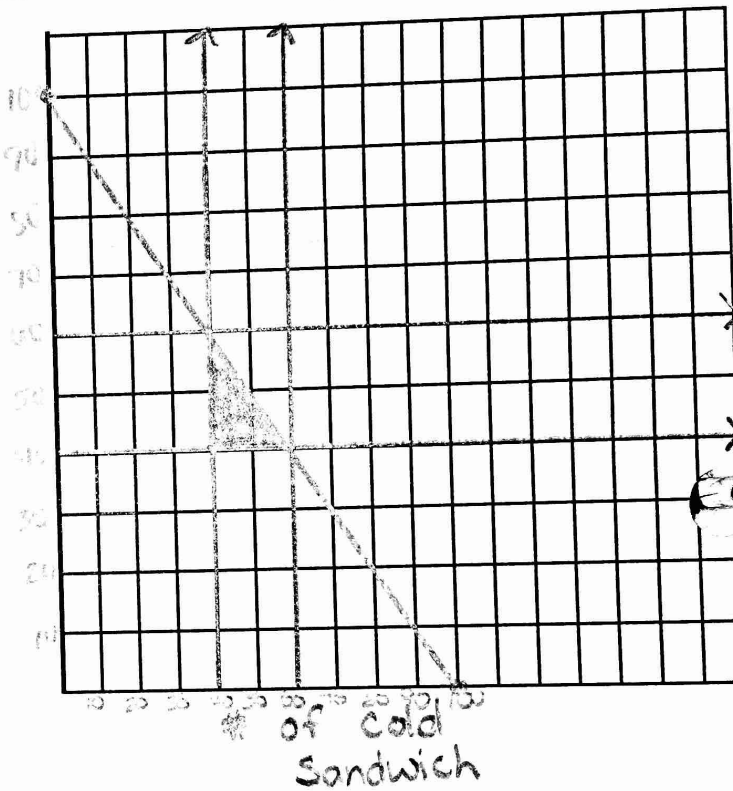
x = # of cold sandwich
y = # of Hot entrees

b. Write the objective function used to maximize the profit

$P = .75x + y$

c. Constraints

Total # of Entrees $x + y \leq 100$
Minimum Cold Entrees $x \geq 40$
Maximum Cold Entrees $x \leq 60$
Minimum Hot Entrees $y \geq 40$
Maximum Hot Entrees $y \leq 60$



d. Graph the constraints and shade the feasible region.

e. List the vertices and find the profit for each vertex

Vertex	Profit
(40,40)	70
(60,40)	85
(40,60)	90

40 Cold Sandwich and 60 Hot entrees for a profit of $90

f. **Make a recommendation (how many of each type should be made and what is the maximum profit)**

Level A

You need to buy some filing cabinets. You know that Cabinet X costs $10 per unit, requires six square feet of floor space, and holds eight cubic feet of files. Cabinet Y costs $20 per unit, requires eight square feet of floor space, and holds twelve cubic feet of files. You have been given $140 for this purchase, though you don't have to spend that much. The office has room for no more than 72 square feet of cabinets.

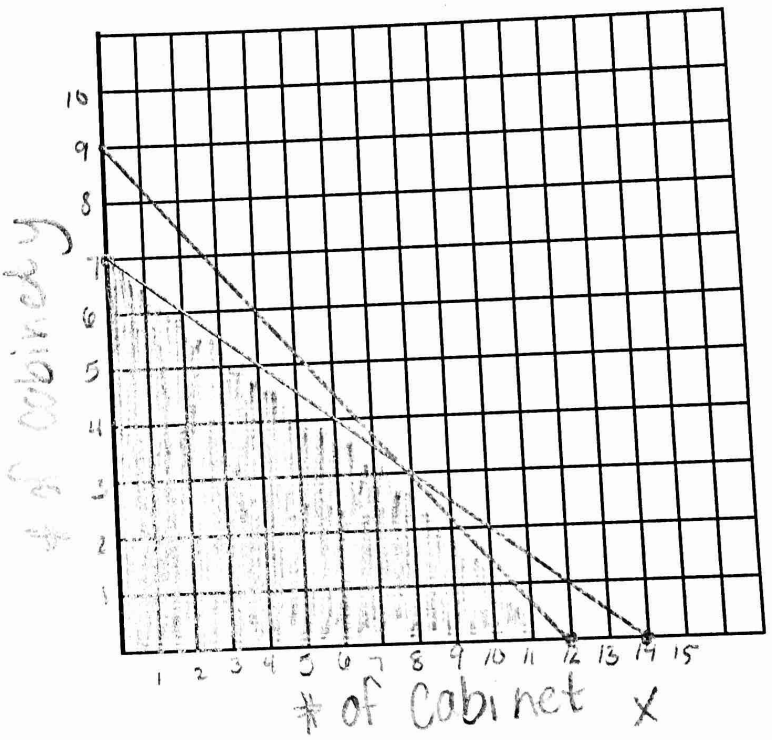
How many of each model should you buy, in order to maximize <u>storage</u> volume (volume is cubic feet of files)?

x - # of cabinet x
y - # of cabinet y

$10x + 20y \leq 140$ (14,0) (0,7)
$6x + 8y \leq 72$ (12,0) (0,9)

$V = 8x + 12y$

Vertex	Volume
(0,0)	0
(12,0)	96
(0,7)	84
(8,3)	100



8 Cabinet x and 3 cabinet y for max. volume of 100 ft³