Linear Programming

Level 1 - Solve simple linear programming problems

Answers:

Level 1

a) Variables:

Let x = number of chairs

Let y = number of tables

Objective Function (Profit):

Maximize: P = 5x + 8y

Constraints:

Finishing: 1x + 3y ≤ 18

Cutting: 2x + 3y ≤ 24

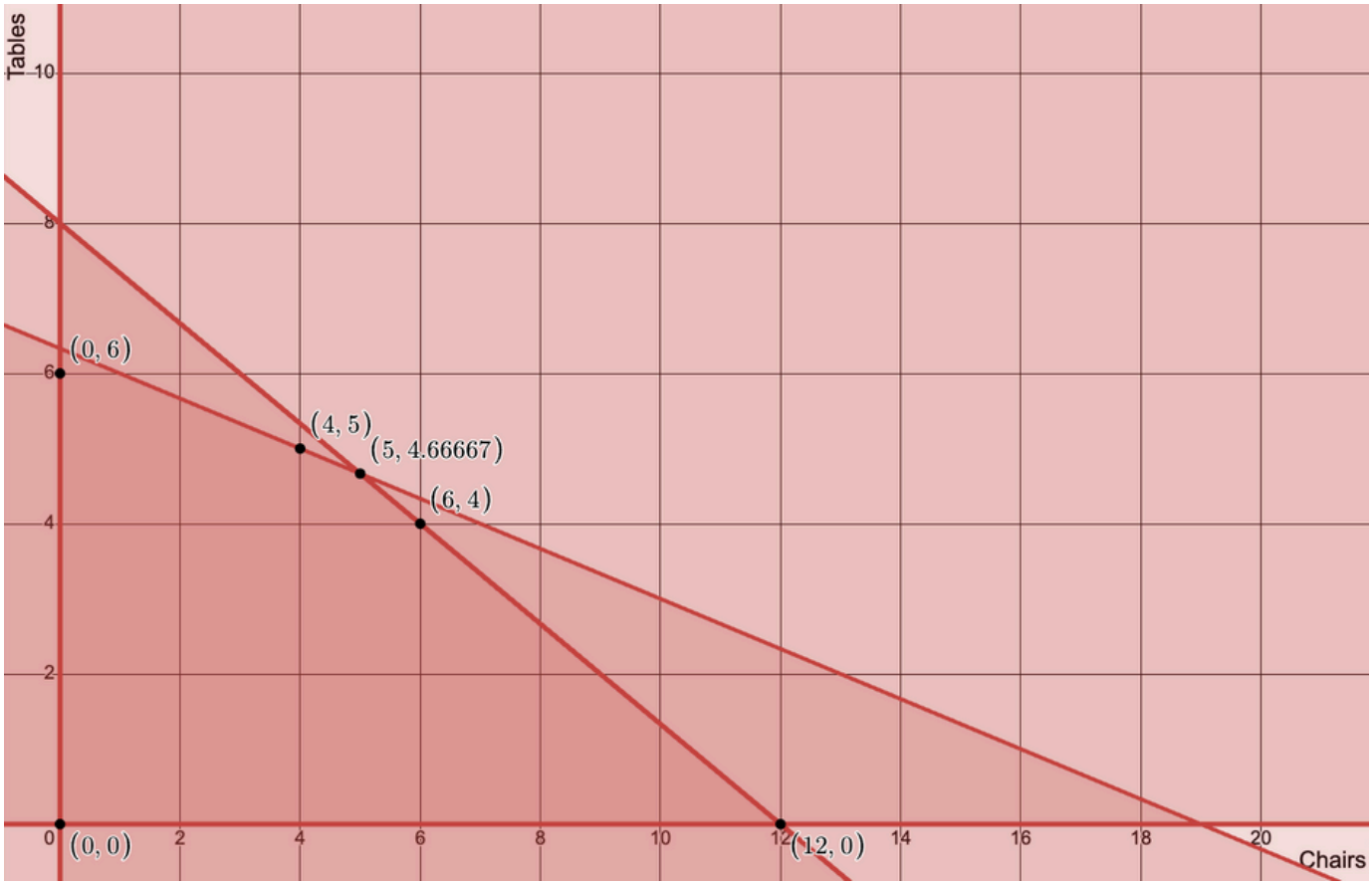
Non-negativity: x ≥ 0, y ≥ 0

Optimal Solution:

Chairs (x): 6

Tables (y): 4

Maximum Profit: $62



Level 1 (continued)

b) Variables:

Let x = number of acres of Wheat

Let y = number of acres of Corn

Objective Function (Profit):

Maximize: P = 30x + 40y

Constraints:

Fertilizer: $3x + 2y \leq 24$

Pesticide: $2x + 1y \leq 16$

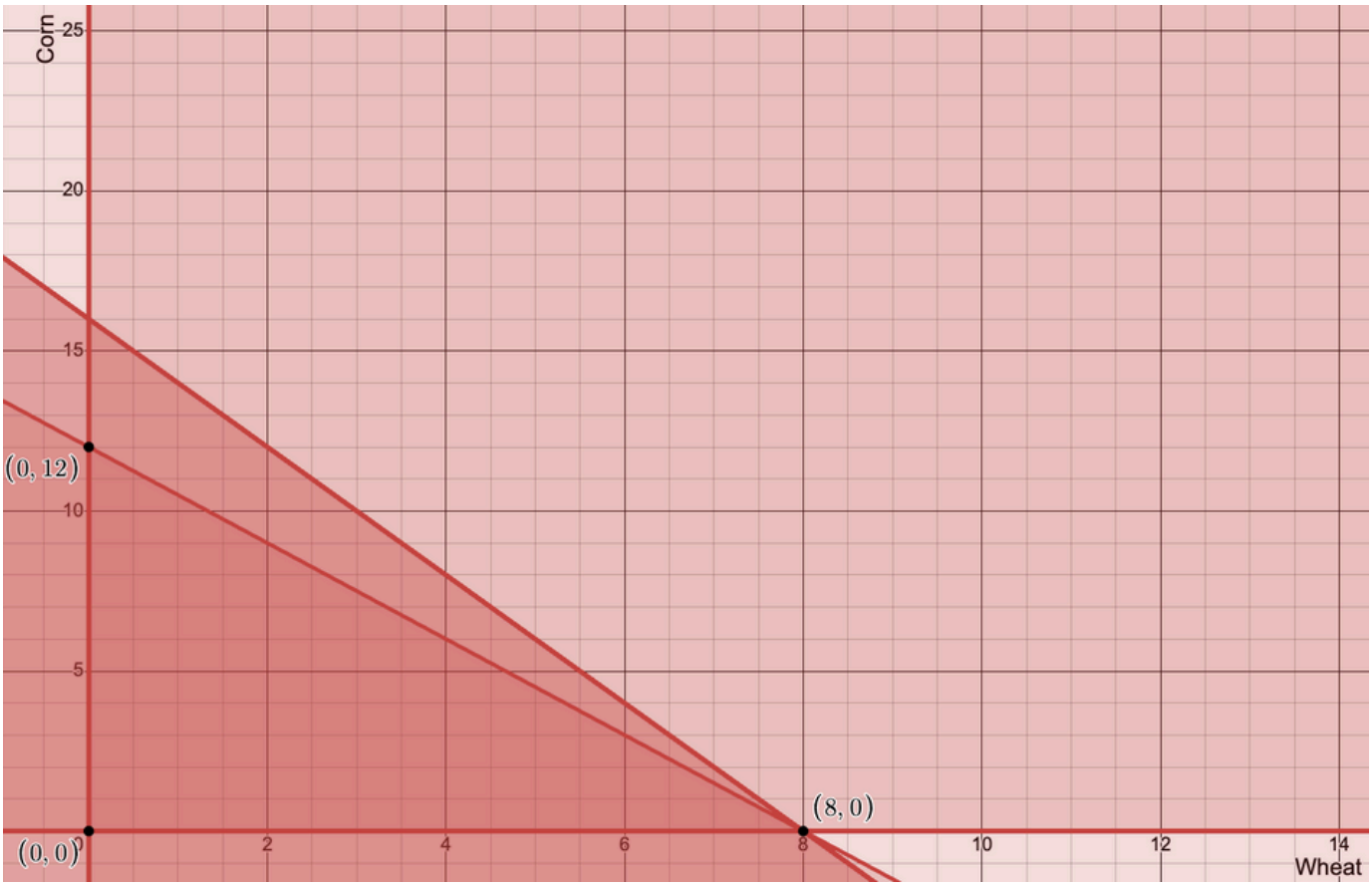
Non-negativity: $x \geq 0, y \geq 0$

Optimal Solution:

Wheat (x) = 0

Corn (y) = 12

Maximum Profit: $480



Level 1 (continued)

c) Variables:

Let x = number of DHL shipments

Let y = number of FedEx shipments

Objective Function (Cost):

Minimize: C = 25x + 30y

Constraints:

Total Shipments: $x + y \geq 15$

Volume: $10x + 12y \geq 160$

Weight: $20x + 15y \geq 240$

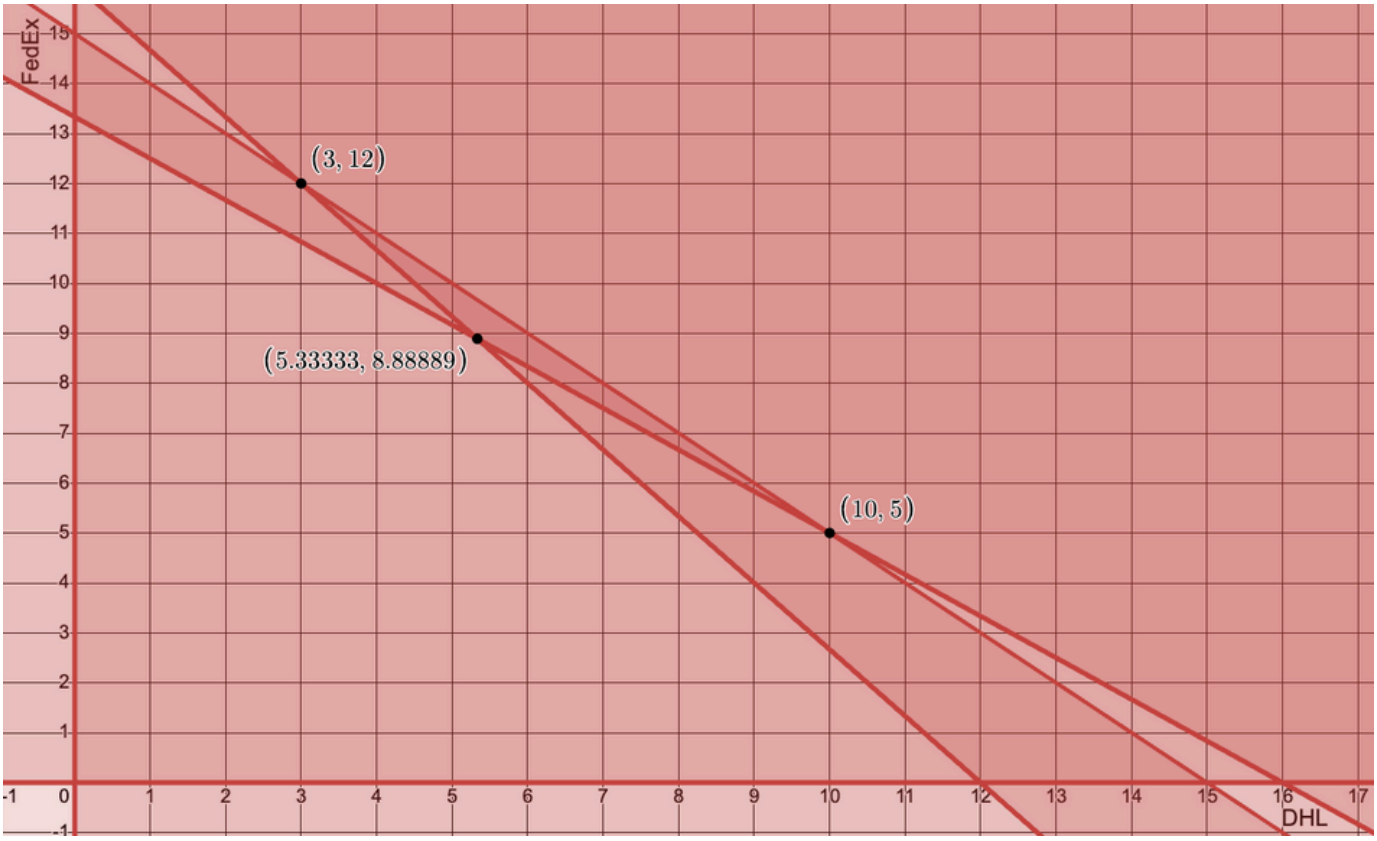
Non-negativity: $x \geq 0, y \geq 0$

Optimal Solution:

DHL (x) = 10

FedEx (y) = 5

Minimum Cost: $400



Level 1 (continued)

d) **Variables:**

Let x = number of T-shirts

Let y = number of Mugs

Objective Function (Profit):

Maximize: Value = 5x + 3y

Constraints:

Quantity: $x + y \geq 12$

Budget: $6x + 3y \leq 60$

Volume: $3x + 2y \leq 36$

Non-negativity: $x \geq 0, y \geq 0$

Optimal Solution:

T-Shirts (x): 4

Mugs (y): 12

Maximum Value: $56