*Chapter 5- Systems of Linear Inequalities*
5.6 – Optimization Problems III: Linear Programming
Goal: Solve optimization problems

The solution to an optimization problem is always found at one of the ___________ of the feasibility region.

______________________________ is a mathematical technique used to determine which solutions in the feasibility region result in the optimal solutions of the objective function.

To determine the optimal solution to an optimization problem using linear programming, follow these steps:
1. Create an algebraic model that includes:

· A defining statement of the ________________ used in your model.

· Any ______________on the variables.

· A system of linear _________________that describe the constraints.

· An _________________function that shows how the variables are related to the quantity being optimized.

2. Graph the system of inequalities to determine the coordinates of the ____________of the feasibility region.

3. ________________ the objective function by _______________ the values of the coordinates of each vertex.

4. Verify your solution(s) satisfies the constraints of the problem situation and explain what the proper solution is.

Example 1:
Chubby Cubbies Education Technologies (CCET) manufactures packages of pattern blocks and linking cubes.

· CCET can produce at least 60 packages of pattern block and linking cubes per day.

· Due to the amount of material at hand, CCET can produce at most 30 packages of pattern block and 50 packages of linking cubes per day.

· The sale price of the pattern blocks is $7 per pack; the sale price of the linking cubes is $5 per pack.

The company wants to know what combinations will result in the maximum revenue, and what revenue that would be.

$

Set variables and determine the domain and range Define constraints and objective function

X = pattern block packs (30 or less, $7 per pack).
Y = linking cube packs (50 or less, $5 per pack).

① $x + y \geq 60$ ③ $y \leq 50$
② $x \leq 30$

$R = \$7x + \$5y$

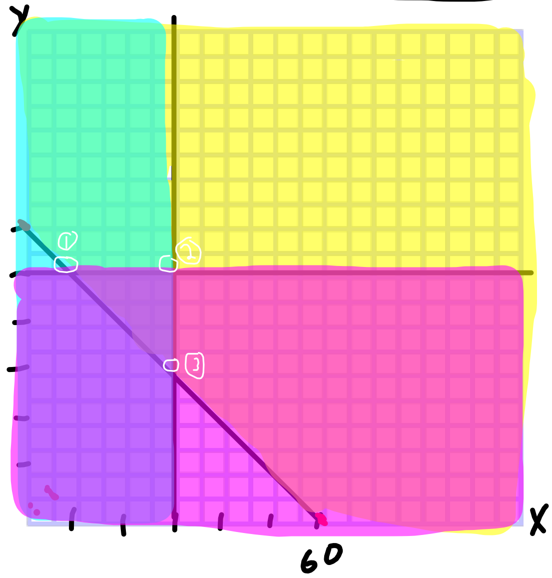
Solve the Inequalities Test point and graph

① x = 60
y = 60

(1, 1)
$1 + 1 \geq 60$ X

②

1. (10,50)
2. (30, 50)
3. (30, 30)




The optimal combination is:

① $320
② $460 (x = 30, y = 50)
③ $360

**Objective Function and Optimized Solution:**

Of the 3 feasible points within our triple shaded area point #2 provides the maximum revenue of $460 which occurs when selling 30 pattern blocks and 50 linking cubes.

.

**Note the change from your blank notes!

Example 2:
L&G Construction is competing for a contract to build a fence.

· The fence needs to be at least 50 ft and will consist of narrow boards that are 6 in. wide and wide boards that are 8 in. wide.

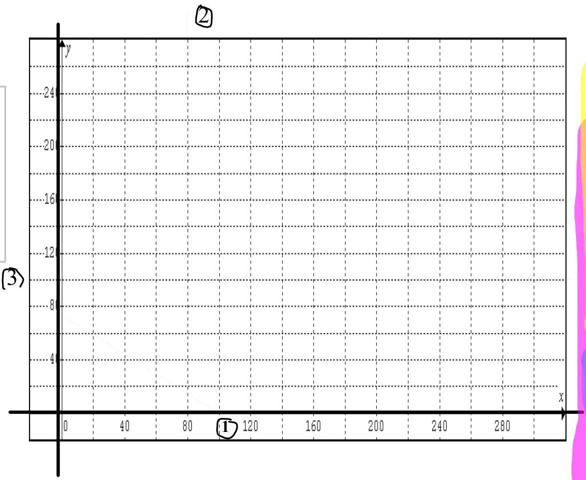
· There must be no more than 100 wide boards and no more than 80 narrow boards.
· The narrow boards cost $3.56 each, and the wide boards cost $4.36 each.

Determine the maximum and minimum costs for the lumber to build the fence.

---

Set variables and determine the domain and range Define constraints and objective function

Create your Inequalities




Determine the maximum and minimum costs for the lumber to build the fence.

Cost = C

The potential optimized points are:

pg. 261-263 Q#: 6, 12, 13