Date ____________________ Foundations Math 11

6.6 Optimization Problems 3: Linear Programming

We have investigated optimization models and solutions. When looking at the solutions, we noticed the importance of the intersection points of the boundaries of the feasible region. Today we look at these points in more detail☺!

When solving an optimization problem by linear programming, we evaluate the objective function at all the points at the “corners” (vertices) of the feasible region. Then, we verify that the maximum and the minimum satisfy all the constraints of the problem.

Linear programming ____

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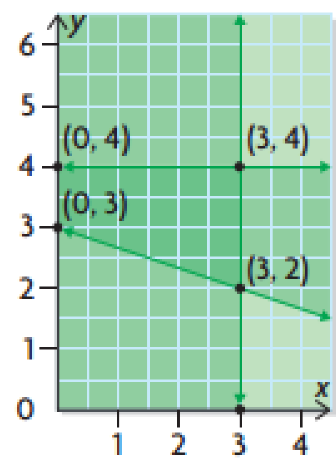
Example 1: The following system of linear inequalities has been graphed below:



System of Linear Inequalities:

$y \geq 0$, $x \geq 0$, $y \leq 4$

$x \leq 3$, $3y \geq -x + 9$

Objective Function: $T = 5x + y$

Objective Function: $T = x + 5y$

Verifying that the constraints are met:

Constraints	Maximum for $T = 5x + y$	Minimum for $T = 5x + y$	Maximum for $T = x + 5y$	Minimum for $T = x + 5y$
$y \geq 0$				
$x \geq 0$				
$y \leq 4$				
$x \leq 3$				
$3y \geq -x + 9$				

Example 2: L & G Construction is competing for a contract to build fences. The fence will be no longer than 50 yards and will consist of narrow boards that are 6 in. wide and wide boards that are 8 in. wide. There must be no fewer 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.

Optimization Model:

Constraints:

Objective Function:

Determine value of Objective Function:

Verifying Constraints:

Worksheet first, then page 341: 1, 5, 6, 11, 13