

LINEAR PROGRAMMING

* A process of optimizing a linear function to find its maximum or minimum value

*The process uses...

- 1) An objective function * usually involves money
- 2) Constraints (in the form of inequalities)
- 3) Graph called the feasible region

* Bounded

* Unbounded

Shaded intersection

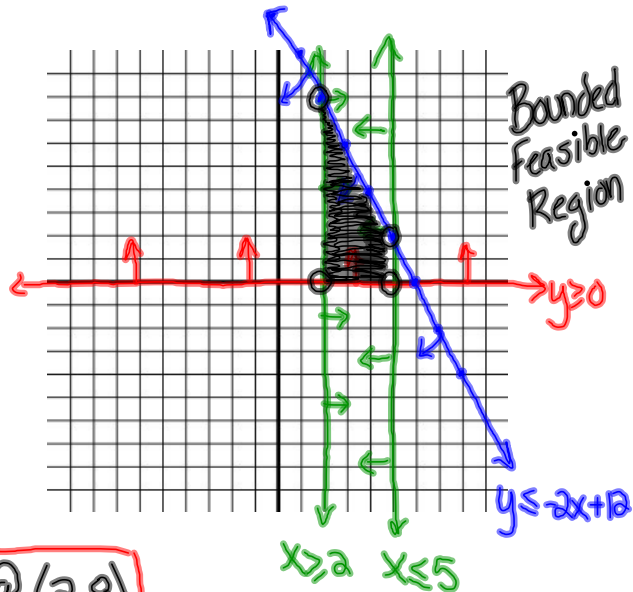
EXAMPLE 1

Objective Function

Find the minimum and maximum value of $C = -x + 3y$ subject to the following constraints.

$$\left. \begin{array}{l} x \geq 2 \\ x \leq 5 \\ y \geq 0 \\ y \leq -2x + 12 \end{array} \right\} \text{constraints}$$

Vertices	Value of function
$(2, 0)$	$C = -2 + 3(0) = -2$
$(2, 8)$	$C = -2 + 3(8) = 22$
$(5, 0)$	$C = -5 + 3(0) = -5$
$(5, 2)$	$C = -5 + 3(2) = 1$



Max = 22 occurs @ (2, 8)
 Min = -5 occurs @ (5, 0)

Corner Point Principle

The maximum and minimum values occur at a vertex of the feasible region.

Example 2

Find the min and max value of $C = x + 5y$ subject to the following constraints.

$$x \geq 0 \quad \updownarrow$$

$$5 \geq x + y \quad 5 - x \geq y$$

$$-x \quad -x$$

$$y - 2 \leq 2x + 2$$

$$+2$$

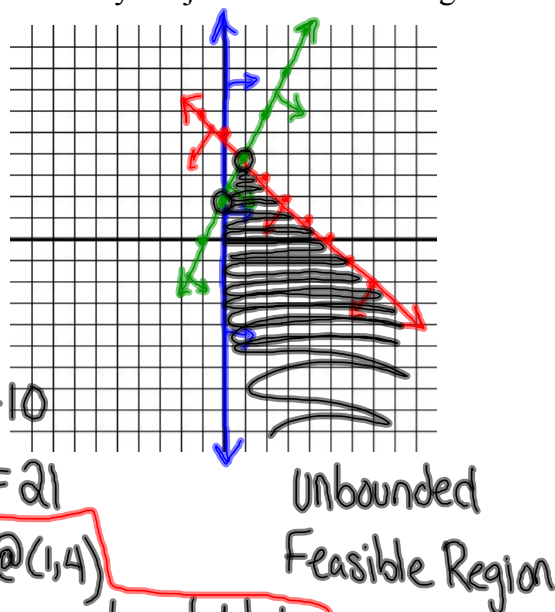
$$y \leq 2x + 2$$

$$(0, 2) \quad C = 0 + 5(2) = 10$$

$$(1, 4) \quad C = 1 + 5(4) = 21$$

$$\text{Max} = 21 \text{ occurs at } (1, 4)$$

* No min because unbounded below



HW p112

#5 - 8 ALL