Linear Programming Guided Notes

Linear Programming – A technique that identifies the min or max value of some quantity

Vertex Principle of Linear Programming – If there's a max or min, it occurs at one or more of the vertices of the feasible region.

1. Find the values of x and y that maximize and minimize P for the objective function $P = 3x + 2y$ given the following constraints:

$$\begin{cases} y \geq \frac{3}{2}x - 3 \\ y \leq -x + 7 \\ x \geq 0; y \geq 0 \end{cases}$$

$P = 3x + 2y$

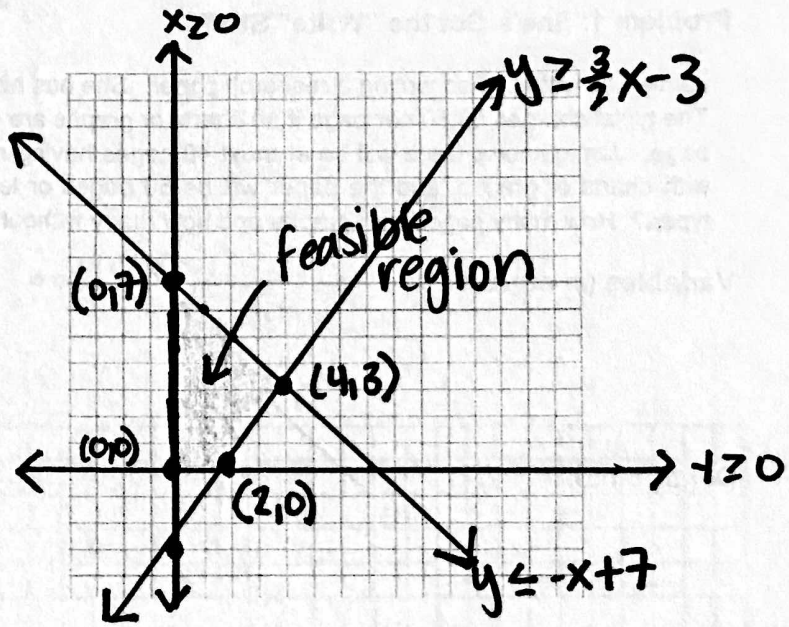
x y

(0,0) → $P = 0$ ← min

(0,7) → $P = 3(0) + 2(7) = 14$

(4,3) → $P = 3(4) + 2(3) = 18$ ← max

(2,0) → $P = 3(2) + 2(0) = 6$



2. Find the maximum and minimum values of x and y that maximize and minimize N for the objective function $N = 100x + 40y$ given the following constraints:

$$\begin{cases} x + y \leq 8 \\ 2x + y \leq 10 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

→ $y \leq -x + 8$

↘ $y \leq -2x + 10$

$N = 100x + 40y$

(0,0) → $100(0) + 40(0) = 0$ min

(0,8) → $N = 100(0) + 40(8) = 320$

(2,6) → $N = 100(2) + 40(6) = 440$

(5,0) → $N = 100(5) + 40(0) = 500$ max