

January 23, 2019

SHEET 4. OPTIMIZATION WITH INEQUALITY CONSTRAINTS

(1) Find the maximum of the function $f(x, y, z) = xyz$ on the set $\{(x, y, z) \in \mathbb{R}^3 : x + y + z \leq 1, \quad x, y, z \geq 0\}$.

(2) Find the minimum of the function $f(x, y) = 2y - x^2$ on the set $\{(x, y) \in \mathbb{R}^2 : x^2 + y^2 \leq 1, \quad x, y \geq 0\}$.

(3) Solve the optimization problem

$$\begin{cases} \min & x^2 + y^2 - 20x \\ \text{s.t.} & 25x^2 + 4y^2 \leq 100 \end{cases}$$

(4) Solve the optimization problem

$$\begin{cases} \max & x + y - 2z \\ \text{s.t.} & z \geq x^2 + y^2 \\ & x, y, z \geq 0 \end{cases}$$

(5) Solve the optimization problem

$$\begin{cases} \max & x^2 - 2xy + 4y^2 \\ \text{s.t.} & x + y \leq 4 \\ & y \geq 2x \\ & x, y \geq 0 \end{cases}$$