Contents

Chapter 1

Smooth Convex Optimization

1.1 Minimization of Smooth Functions

1.1.1 Smooth Convex Functions

In this section, we consider the unconstrained minimization problem

$$\min_{\boldsymbol{x} \in \mathbb{R}^n} f(\boldsymbol{x}), \tag{1.1.1}$$

where the objective function $f(\cdot)$ is smooth enough. $\mathscr{F}$ represents *differentiable functions.*

Assumption 1.1.1

For any $f \in \mathscr{F}$, the first-order optimality condition is sufficient for a point to be a global solution to 1.1.1

Assumption 1.1.2

If $f_1,\ f_2 \in \mathscr{F}$ and $\alpha,\ \beta \geq 0$, then $\alpha f_1 + \beta f_2 \in \mathscr{F}$.

Assumption 1.1.3

Any linear function $l(\boldsymbol{x}) = \alpha + \langle , \boldsymbol{x} \rangle$