

## Worksheet on Barrier Functions: Example 2

$$\begin{aligned} \min_x & (x+1)^2 \\ \text{s.t.} & x \geq 0 \end{aligned}$$

1. Transform the problem into a barrier function form:

$$\begin{aligned} \min_{x \in \mathbb{R}^n} & f(x) \\ \text{s.t.} & c(x) = 0 \\ & x \geq 0 \end{aligned} \quad \longrightarrow \quad \begin{aligned} \min_{x \in \mathbb{R}^n} & f(x) - \mu \sum_{i=1}^n \ln(x_i) \\ \text{s.t.} & c(x) = 0 \end{aligned}$$

2. Verify the optimal barrier function solution as  $\mu$  approaches 0.

