Coursework (3) for *Introductory Lectures on Optimization*

Your name
Your ID

Oct. 17, 2022

Excercise 1. Suppose that $f : \mathbb{R}^n \to \mathbb{R}$ is L-smooth ($C_L^{1,1}$), and μ-PL, that is

$$\mu\text{-PL:}\quad \frac{1}{2}\|\nabla f(\boldsymbol{x})\|_2^2 \geq \mu\left(f(\boldsymbol{x}) - f(\boldsymbol{x}^*)\right),$$

then GD iterates with step size $h_k = 1/L$ converge linearly, i.e.

$$f(\boldsymbol{x}_k) - f(\boldsymbol{x}^*) \leq \left(1 - \frac{\mu}{L}\right)^k \left(f(\boldsymbol{x}_0) - f(\boldsymbol{x}^*)\right).$$

Proof of Excercise 1: bla.bla... bla bla.. bla. □