Labs

**Optimization for Machine Learning** Spring 2023

#### **EPFL**

School of Computer and Communication Sciences

Martin Jaggi & Nicolas Flammarion
github.com/epfml/OptML\_course

# Problem Set 7, April 21, 2023 (Newton)

# Non-convex

Solve Exercises 40, 41, 42 from the lecture notes. These exercises are carried over from last week.

## **Newton's Method**

Solve Exercises 48, 50 from the lecture notes.

### **Quasi-Newton Methods**

Solve Exercise 53.

#### **Fixed Point Iteration**

The Jupyter notebook in template/ contains the solution from Lab 03's exercise on fixed point iteration. Recall that we showed that the iterations to find a fix point of the g function can be seen as taking gradient step on a f function:

$$x_{t+1} = x_t - \gamma f'(x_t) = g(x_t)$$
.

Please complete the notebook and adapt the algorithm to use Newton updates

$$x_{t+1} = x_t - \frac{f'(x_t)}{f''(x_t)}$$
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