UNIVERSITE DE GENEVE
Faculté des sciences

Section de Mathématiques

**Optimization with Application I**
**Exercise Sheet 5 - Discussed on 04.12.2020**

**Exercise 1.** For $y \in \mathbb{R}^N, X \in \mathbb{R}^{N \times P}$ and $\lambda > 0$, derive the formula to implement a relaxation algorithm to solve :

— Ridge Regression

$$\arg\min_{\alpha} \frac{1}{2}||y - X\alpha||_2^2 + \lambda||\alpha||_2^2$$

— The Lasso

$$\arg\min_{\alpha} \frac{1}{2}||y - X\alpha||_2^2 + \lambda||\alpha||_1$$