1 Problem set

Exercise (i) (7P) Enter the missing code snippets in the jupyter notebook. Partial credit will be awarded.

Exercise (ii) (2P) Prove that the quadratic function

$$f(x) = \frac{1}{2}x^T Q x + b^T x + c$$

is **smooth** with parameter $\|Q\|$.

Exercise (iii) (1P) Suppose that we have observations (x_i, y_i) which are **centered**, meaning that $\sum_{i=1}^n x_i = 0 = \sum_{i=1}^n y_i$. Let (b^*, w^*) be the global minimum of the least squares objective

$$f(b, w) = \sum_{i=1}^{n} \left(b + w^T x_i - y_i\right)^2.$$

Prove that $b^* = 0$.