Problem Set 1

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1. Given $y \in \mathbb{R}^n$ and a linear operator $A : \mathbb{R}^n \longrightarrow \mathbb{R}^n$, compute the **gradient** of the n-dimensional function $f : \mathbb{R}^n \longrightarrow \mathbb{R}$ defined as

$$f(x) = \frac{1}{2}\|Ax - y\|_2^2. \tag{1}$$

2. Compute the gradient of $g\colon x \mapsto \|x\|_2^2$.

3. Let $\lambda > 0$. Deduce $\nabla(f + \lambda g)(x)$