- Norm:

Typically, we use norm for vectors: $\|e\|_p = \sqrt[p]{\sum |e_i|^p}$

So, we have:

if $p = 1$, $\|e\|_1 = \sum |e_i|$

if $p = 2$, $\|e\|_2 = \sum e_i^2 = e^T e$

if $p = \infty$, $\|e\|_\infty = \max_i |e_i|$

Application:

When considering optimization with norm, we always consider 2-th norm,

Because if e_i is smooth, then 2-th norm is always smooth