

## **CONVEX FUNCTIONS**

## Why

We generalize convex functions to arbitrary vector spaces.

## Definition

Suppose  $(X, \mathbf{R})$  is a real vector space. Then  $f: X \to \mathbf{R}$  is *convex* if

$$f(tx + (1-t)y) \le tf(x) + (1-t)f(y)$$

for all  $t \in [0,1]$  and  $x, y \in X$ .

## Example

Any norm is a convex function.

