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

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

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

Example

Any norm is a convex function.