



Why

We speak of a function which always bends up.

Definition

A *convex* real-valued function is a function defined on a convex set of real numbers for which the result of the function on a convex combination of any two points in the domain is smaller than the convex combination of the same length of the value of the function on the endpoints.¹ A function $f : \mathbf{R} \rightarrow \mathbf{R}$ is *concave* if the function $-f$ is convex.

Notation

Let $A \subset \mathbf{R}$ be a convex set. The function $f : A \rightarrow \mathbf{R}$ is convex if, for any $a, b \in A$ and $t \in [0, 1]$,

$$f(ta + (1 - t)b) \leq tf(a) + (1 - t)f(b).$$

¹Future editions will include figures

