



Why

We speak of functions which always bends up.¹

Definition

Suppose $X \subset \mathbf{R}$ is a convex set. A function $f : X \rightarrow \mathbf{R}$ is *convex* if

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

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

In other words, a 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.

f is *concave* if $-f$ is convex.

¹Future editions may expand.

