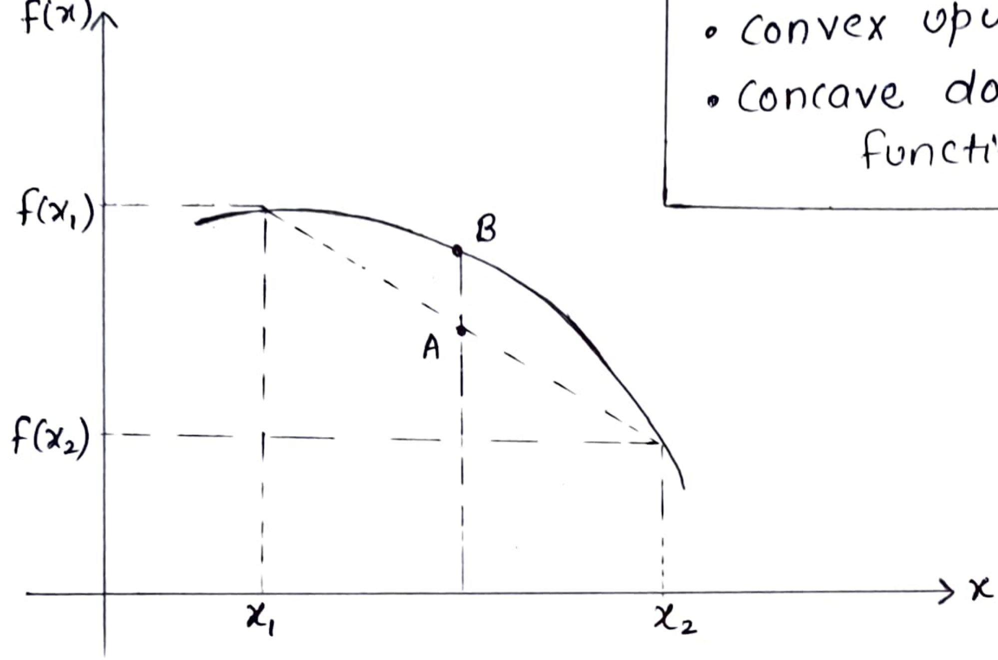
CONCAVE



Other Name

- convex upward function
- Concave downward function

A function $f : R^n \rightarrow R$ is concave if its domain is a convex set and for all x, y in its domain, and all $\lambda \in [0,1]$,

we have.

$$f(\lambda x_1 + (1-\lambda)x_2) \geq \lambda f(x_1) + (1-\lambda) f(x_2)$$

- In words, this means that if we take any two points x_1, x_2 then 'f' evaluated at any cancav combination of these two points should be no shorter than the same concave combination of $f(x_1)$ and $f(x_2)$.
- Geometrically, the line segment connecting $f(x_1)$ to $f(x_2)$ must sit down the graph of 'f'.
- we say that 'f' is convex if '$-f$' is concave.

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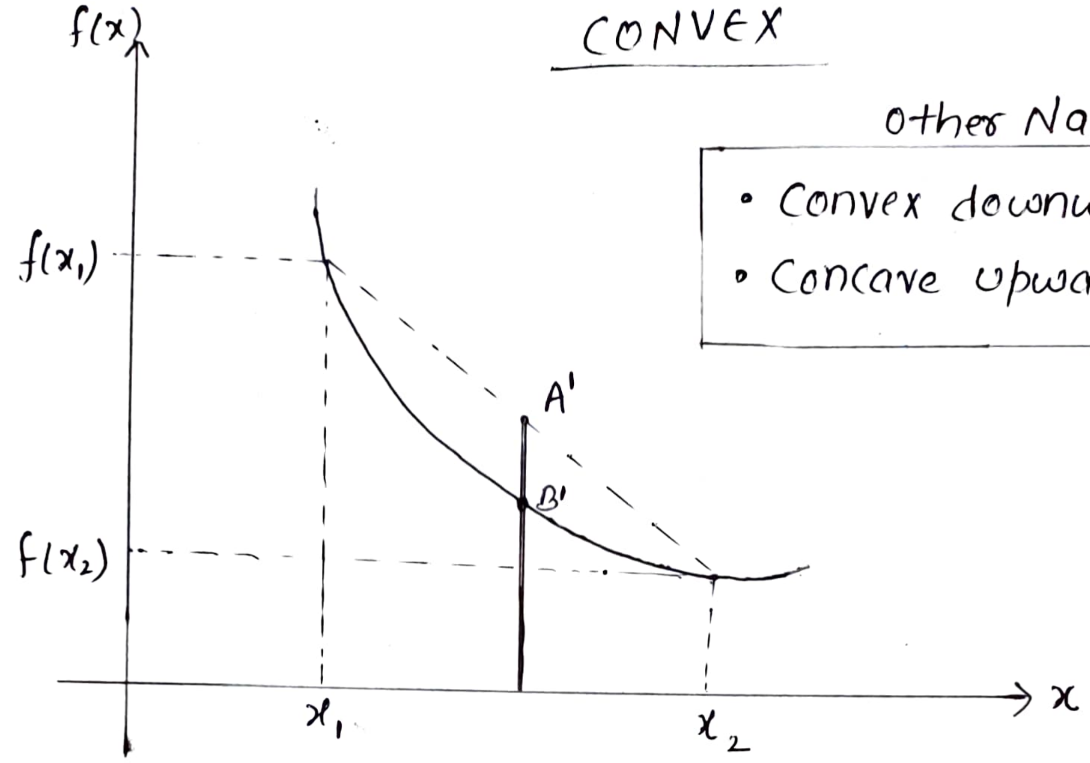

CONVEX

Other Name

- Convex downward function
- Concave upward function

A function $f: R^n \to R$ is convex if its domain is a convex set and for all x, y in its domain, and all $\lambda \in [0, 1]$, we have,

$$f(\lambda x_1 + (1-\lambda)x_2) \leqslant \lambda f(x_1) + (1-\lambda) f(x_2)$$

- In words, this means that if we take any two points x_1, x_2 then 'f' evaluated at any convex combination of these two points should be no longer than the same convex combination of $f(x_1)$ and $f(x_2)$.
- Geometrically, the line segment connecting $f(x_1)$ to $f(x_2)$ must ~~be~~ sit above the graph of 'f'.
- We say that 'f' is concave if '$-f$' is convex.