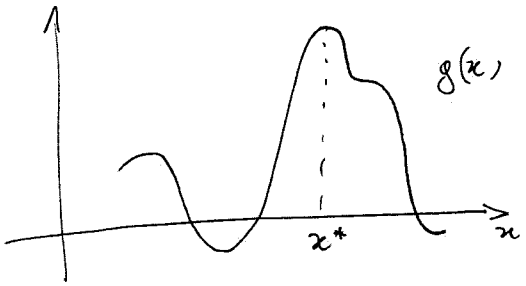
⊛ Given $f: \mathbb{R} \to \mathbb{R}$ s.t. $\forall_{x,y \in \mathbb{R},\, y>x},\ f(y) > f(x)$

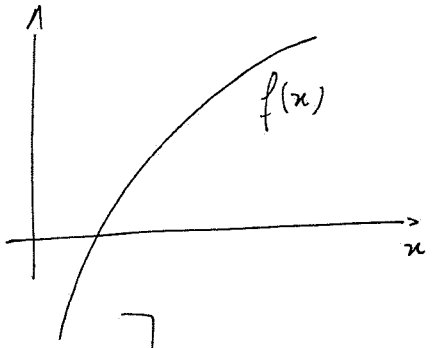
$g: \mathbb{R} \to \mathbb{R}$, $\quad x^* = \underset{x \in \mathbb{R}}{\operatorname{argmax}}\ g(x) \iff \forall x \in \mathbb{R}: g(x^*) \geq g(x)$

$\Longrightarrow$

$x^* = \underset{x \in \mathbb{R}}{\operatorname{argmax}}\ f(g(x)) \iff$.

$\forall x \in \mathbb{R} : f(g(x^*)) \geq f(g(x))$.





LEMMA:

if $f(y) < f(x) \Rightarrow x^* = \underset{x \in \mathbb{R}}{\operatorname{argmin}}\ f(g(x))$.