CSCI 378 HW10

(a) Prove the following theorem (by contradiction):

> **Theorem 1:** For functions $f: \mathbb{R} \to [0, \infty)$
> $g: [0, \infty) \to \mathbb{R}$,
> if g is monotonically increasing, then:
> $$\underset{x}{\operatorname{argmin}}\ f(x) = \underset{x}{\operatorname{argmin}}\ g(f(x))$$

(Note: a function g is <u>monotonically increasing</u> iff
$y_1 > y_2 \Leftrightarrow g(y_1) > g(y_2)$ for all $y \in \operatorname{dom}(g)$)

(b) Prove the following corollary of Thm 1:

$\boxed{\text{Corollary: For function } f: \mathbb{R} \to [0,\infty): \quad \underset{x}{\operatorname{argmin}}\, f(x) = \underset{x}{\operatorname{argmin}}\, \log f(x)}$