Exercise 1: Suppose $f : A \to \mathbb{R}$ and c is a limit point of A. Suppose $f(x) \geq 0$ for all $x \in X$ and that $\lim_{x\to c} f(x)$ exists. Show that the limit is non-negative. Provide two proofs, one $\epsilon - \delta$ style, and the other using the sequential characterization of limits.

Proof. Suppose $f : A \to \mathbb{R}$ and c is a limit point of A. Suppose $f(x) \geq 0$ for all $x \in X$ and that $\lim_{x\to c} f(x) = L$ exists. By the $\epsilon - \delta$ of the function limit we know that for $\epsilon > 0$ there exists some $\delta > 0$ where if $0 < |x - c| < \delta$ then $|f(x) - L| < \epsilon$

-$\epsilon < f(x) - L < \epsilon$‘’

$\square$