Proof. Let $N \in \mathbb{N}$ such that $\frac{1}{N} < \epsilon$ (By LINK TO ARCHIMEDIAN PROPERTY). Then let $n \geq N$ such that:

$$\begin{aligned} n &\geq N > \tfrac{1}{\epsilon} \\ \tfrac{1}{n} &\geq \tfrac{1}{N} < \epsilon && \text{taking reciprocals} \\ |\tfrac{1}{n} - 0| = |\tfrac{1}{n}| &= \tfrac{1}{n} && \text{since } \tfrac{1}{n} \text{ is always positive for } n \in N \\ &< \epsilon \end{aligned}$$

■