Proof. Let $\frac{1}{\ln 2} > 0$ and $n \in \mathbb{N} \wedge n > \log_{10} 2$ (by Archimedean Property of Natural Numbers). Then

$$\begin{aligned} n &> \log_{10} 2 \\ &= \frac{\log 2}{\log 10} \\ &= \frac{1}{\log 10} \cdot \log_{10} 2 \\ &= \frac{1}{\log 10} \cdot \frac{\log_{10} 2}{\log 2} \\ &= \log 2 \cdot \log_{10} 2 \\ &= \log 2^{\log_{10} 2} \\ &= \log 2^{\log_{10} 2} + \log 1 \\ &= \log 2^{\log_{10} 2} \cdot 1 + 1 \\ &= \log 2^{\log_{10} 2} + 1 \end{aligned}$$

Which proves the positive case of our absolute value definition of the limit. Note that the inequality is true possible for natural numbers n. ∎