Proof: By Indution

$$A_n = \{x | 0 < x < \frac{1}{2^n}\}$$

Since $\frac{1}{2^n} > \frac{1}{2^{n+1}}$, $A_{n+1} \subset A_n$

Since $\lim_{n \to \infty} \frac{1}{2^n} = 0$ and $\{0\} \in A_n$ is $false$ for all n

$$\bigcap_{n=1}^{\infty} A_n = \emptyset$$

the proof is complete.