Submission for the Test Flight Project for Introduction to Mathematical Thinking.

Problem 10:

Proposition: For the collection of intervals $A_n = [0, \frac{1}{n})$, where $n = 1, 2, ...$, every $A_{n+1} \subset A_n$ and $\bigcup_{n=1}^{\infty} A_n = \{0\}$.

Proof: Because $\frac{1}{n}$ decreases as n increases and cannot be negative, we know that the limit of $\frac{1}{n}$ goes to 0 as n goes to ∞. Thus, the limit of the right side of the interval will go to 0 as n goes to ∞, so the interval will tend to $[0, 0)$. And because the interval is closed on both sides, 0 is the only member of that set, so the intersection of all of the intervals A_n will be $\{0\}$. $\square$