9. Give an example of a family of intervals $A_n, n = 1, 2, ...,$ such that $A_{n+1} \subset A_n$ and $\bigcap_{n=1}^{\infty} A_n = \emptyset$.

   Consider the set of intervals A_n, where each interval is given by $(0, \frac{n}{n^2}]$.

   $A_{n+1} \subset A_n$ for all n.

   Proof:

   Suppose $A_{n+1} \not\subset A_n$.

   Then $\exists x > 0 \in A_n, x \notin A_{n+1}$.

   $x \in A_n$ implies $x \leq \frac{n}{n^2} (since x$ is in the interval $(0, \frac{n}{n^2}])$.

   $x \notin A_{n+1}$ implies $x > \frac{n+1}{(n+1)^2}$ (since $x > 0$, it must be a positive upper bound of the interval $(0, \frac{n+1}{(n+1)^2}])$.

   But $\frac{n+1}{(n+1)^2} < \frac{n}{n^2}$.

   So, according to the above logic, $\frac{n+1}{(n+1)^2} < x < \frac{n+1}{(n+1)^2} \leq \frac{n}{n^2}$, which is a contradiction.

   Therefore, $A_{n+1} \subset A_n$ for all n.