Directions: Solve the following open-ended problem, based Frankl's union-closed sets conjecture.

1. Find the largest function f such that the following holds. If \mathcal{F} is a nonempty, union-closed subset of $2^{[n]}$ with $\emptyset \notin \mathcal{F}$, then there exists $x \in [n]$ such that $\frac{|\{A \in \mathcal{F}: x \in A\}|}{|\mathcal{F}|} \geq f(n)$. Comment: Frankl's conjecture states that f(n) = 1/2. Proving that $f(n) \geq \varepsilon$ for some positive ε would represent a major advance. So, it is likely that your function will tend to 0 as $n \to \infty$. The goal is to establish the statement for a function f that approaches 0 as slowly as possible.