1. Let $X_1, X_2, \ldots, X_n$ be independent identically distributed random variables with density functions
$$f(t) = \begin{cases} 0, & \text{if } t \notin [0, 1] \\ \theta t^{\theta-1}, & \text{if } t \in [0, 1] \end{cases}$$
Find the maximum likelihood estimator for θ, where $\theta > 0$ is the unknown parameter.