Finding MLEs (1)

1. Let $X_1, \ldots, X_n | \theta \overset{iid}{\sim} \text{Exp}(\theta)$. Find an MLE for θ.

2. Let $X_1, \ldots, X_n | \theta \overset{iid}{\sim} \text{Uniform}[-\theta, \theta]$ where $\theta > 0$. Find $\hat{\theta}_{MLE}$ if it exists.

3. Let $X_1, \ldots, X_n | \theta \overset{iid}{\sim} f(x|\theta)$ where

$$f(x|\theta) = \begin{cases} \theta x^{\theta-1} & \text{if } 0 < x < 1 \\ 0 & o.w. \end{cases}$$

and $\theta > 0$. Find an estimator of θ using the method of maximum likelihood.