

1. Let  $X_1, X_2, \dots, X_n$  be independent identically distributed random variables with density function

$$h(t; \theta) = \begin{cases} 0, & \text{if } t \notin [0, \theta] \\ \frac{2t}{\theta^2}, & \text{if } t \in [0, \theta]. \end{cases}$$

Find the maximum likelihood estimator for  $\theta$  and compute the bias of the maximum likelihood estimator for  $\theta$ .