Fisher Information

1. Suppose $X|\theta \sim \text{Exp}(\theta)$. Find the Fisher Information $I(\theta)$ for the unknown parameter θ in this single sample.

2. Try to interpret the Fisher Information. That is, how does the amount of information X contains about θ change with θ? Is it equal to the precision (inverse variance) of X?

3. Now suppose $X_1, \ldots, X_n|\theta \sim \text{Exp}(\theta)$. Find the Fisher Information $I_n(\theta)$ for the unknown parameter θ in this random sample of n observations.