

Discussion 4

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Interval Estimation

- ▶ An interval estimator for θ is defined by two random variables $[\hat{\theta}_L, \hat{\theta}_U]$, i.e.

$$\mathbb{P}(\hat{\theta}_L \leq \theta \leq \hat{\theta}_U) = 1 - \alpha$$

where α is called the significance level.

- ▶ **Pivotal method**

1. A pivot Q is a function of the sample measurements and θ .
2. The pdf of Q does not depend on the parameter θ .

- ▶ The idea:

$$\begin{aligned}\mathbb{P}(a \leq Q \leq b) &= 1 - \alpha \\ \Rightarrow \mathbb{P}(\hat{\theta}_L \leq \theta \leq \hat{\theta}_U) &= 1 - \alpha\end{aligned}$$

via some algebraic transformation.

Example

- ▶ Suppose that X_1, \dots, X_{10} is a sample from a $Exp(\theta)$. Construct a two-sided $1 - \alpha$ confidence interval for θ .