TD1 STT5100

Exercise 1

Let $X_1, X_2, ..., X_n$ be a random sample from pdf

$$f(x/\theta) = \theta x^2, 0 < \theta \leq x < \propto$$

- What is the sufficent statistic for θ?
- Find the MLE of θ?
- Find the method of the moment estimator of θ?

Exercise 2

The independante random variables $X_1, X_2, ..., X_n$ have the common distribution

$$P(X_i \leq x/\alpha, \beta) = 0, \quad if \quad x < 0$$
$$P(X_i \leq x/\alpha, \beta) = (x/\beta)^\alpha, \quad if \quad 0 \leq x \leq \beta$$
$$P(X_i \leq x/\alpha, \beta) = 1, \quad if \quad \beta < x$$

- Find a two-dimentional sufficient statistic for (α, β)
- Find the MLEs of α and β
- The length (in mm) of cuckoos eggs found in hedge sparrow nests can be modeled with this distribution. For the data

20.0, 23.9, 20.9, 23.8, 25.0, 24.0, 21.7, 23.8, 22.8, 23.1, 23.1, 23.5, 23, 23

Find the MLEs of α and β

Exercise 3

Let $X_1, X_2, ..., X_n$ be iid with pdf

$$f(x|\theta) = \theta x^{\theta - 1}$$

- Find the MLE of θ, and show its variance $\longrightarrow 0$ as $n \longrightarrow \infty$
- Find the method of moments estimator of θ

R Tutorial (Script R en cours)

- Importation des données de divers sources de données
- Nettoyage de données
- Données manquantes
- Recodage des données
- Exploration des données