

HW 6

Your name here!

Problem 1 (8.31) Anne spins a (fair) coin three times and observes no heads. She gives the coin to Noha who decides to spin the coin until a heads occurs. Noha spins the coin a total of four times. Let θ be the probability the coin comes up heads.

- (a) What is the likelihood of θ ?
- (b) What is the MLE for θ ?

Problem 2 (8.21) Suppose that X_1, \dots, X_n are IID with density $f(x) = e^{-(x-\theta)} \mathbb{I}\{x \geq \theta\}$.

(a) Find the method of moments estimate of θ .

(b) Draw a sketch of the likelihood function for observed data $(x_1, x_2, x_3) = (1, 2, -1)$.

Problem 3 (8.21) As in the previous problem, suppose that X_1, \dots, X_n are IID with density $f(x) = e^{-(x-\theta)} \mathbb{I}\{x \geq \theta\}$. Find the MLE of θ .

Problem 4 (8.4) Suppose X is a discrete RV with mass function

$$\begin{aligned}P(X = 0) &= \frac{2}{3}\theta \\P(X = 1) &= \frac{1}{3}\theta \\P(X = 2) &= \frac{2}{3}(1 - \theta) \\P(X = 3) &= \frac{1}{3}(1 - \theta),\end{aligned}$$

where $0 \leq \theta \leq 1$. The following 10 independent observations were taken from this distribution: $(3, 0, 2, 1, 3, 2, 1, 0, 2, 1)$.

- (a) Find the likelihood for θ .
- (b) Assume the prior $\theta \sim Unif[0, 1]$ and find the posterior distribution for θ .