

## HW 6

**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  $\theta$  be the probability the coin comes up heads.

- (a) What is the likelihood of  $\theta$ ?
- (b) What is the MLE for  $\theta$ ?

**Problem 2 (8.53)** Let  $X_1, \dots, X_n$  be IID  $Unif[0, \theta]$ .

- (a) Find the method of moments estimate of  $\theta$  and its mean and variance.
- (b) Find the MLE of  $\theta$  and find its sampling distribution.

**Problem 3 (8.53)** Let  $X_1, \dots, X_n$  be IID  $Unif[0, \theta]$ .

- (a) Compare the variance, bias, and the mean squared error of the MOM estimator and the MLE from Problem 2 (above).
- (b) Find a modification of the MLE that renders it unbiased.