

MATH450, Fall 2019, Homework 3.
Due Thursday, October 3rd, 9:30am

1. Section 7.1: 13, 15
2. Section 7.2: 23, 26
3. Suppose that for a parameter $0 \leq \theta \leq 1$, X is the outcome of the roll of a four-sided tetrahedral die

x	0	1	2	3
$p(x)$	$\frac{2\theta}{3}$	$\frac{\theta}{3}$	$\frac{2(1-\theta)}{3}$	$\frac{(1-\theta)}{3}$

Suppose the die is rolled 10 times with outcomes

3, 0, 2, 1, 3, 2, 1, 0, 2, 1

- (a) Use the method of moments to obtain an estimator of θ .
 - (b) Use the method of maximum likelihood to obtain an estimator of θ .
4. Let X_1, X_2, \dots, X_n be a random sample of size n from a Bernoulli distribution with probability of success p

x	0	1
$p(x)$	$1-p$	p

Assume that we estimate p by using

$$\hat{X} = \frac{X_1 + X_2 + \dots + X_n + \sqrt{n/4}}{n + \sqrt{n}}$$

Compute the bias, the variance and the MSE of this estimator.