MATH450, Fall 2020, Homework 3.
Due Thursday, October 8th, 9:30am

1. Section 7.1: 11, 13

2. 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.

3. Let $X_1, X_2, \ldots, X_n$ 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

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

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