Homework 6

Part 1:

1. Briefly explain what information the CRLB provides about the class of unbiased estimators of a parameter.
2. Does the CRLB only apply to unbiased estimators of the parameter? Briefly explain.
3. The efficiency of an estimator is the ratio of the CRLB to the variance of the estimator. What is the largest possible value of the efficiency for an estimator? Briefly explain.

Part 2:

1. Find the CRLB for an unbiased estimator of θ from a random sample of size n from a Bernoulli(θ) distribution.
2. Show by direct calculation that the variance of the sample mean attains this CRLB.
3. What is the CRLB for unbiased estimators of the variance of a Bernoulli(θ) distribution?
4. Apply the Attainment Theorem (Corollary 7.3.15) to a random sample of size n from a Bernoulli(θ) distribution. Is there an unbiased estimator of a function of θ that attains the CRLB?
5. Can the attainment theorem be used to find an unbiased estimator of a function of the variance of a Bernoulli(θ) that attains the CRLB?

Part 3: Complete the following Casella & Berger Problems. The problems were chosen to practice MSE, the Rao-Blackwell Theorem, the CRLB Attainment Corollary, and Theorem 7.3.23.

- 7.38
- 7.46 (a, b, and c only)
- 7.60