

Homework 5

Math 483 Fall 2019. Due Sept. 26 by 5pm.

Problems from the Book

Chapter 6: 3.

Problem A.

For the estimator from the Problem 6.2, prove that it's consistent.

Problem B.

The angular width W of an object was measured $n = 90$ times and yielded the sample mean of 3.05° and standard deviation of 0.28° . Use Delta-method to approximate the “distribution” of the estimated object size where

$$\widehat{\text{Size}} = 50 \sin \bar{W}$$

(that is, in the language of Chapter 6, you are to find a point estimate of **Size** and the standard error of that estimate). Confirm your results with a simulation study.

Problem C.

For comparing gas mileage of cars in two types of driving conditions, two samples were collected, and the following results for gas mileage in mpg (miles per gallon) obtained

	n	mean	st.dev.
Type I	80	24.8	2.3
Type II	100	25.6	1.6

Calculate the 99% C.I. for the difference of “true” means between the two types of conditions.

Problem D.

For X_1, X_2, \dots, X_n an i.i.d. random sample from $\mathcal{N}(0, \sigma^2)$ distribution, let $\tau = \ln \sigma$. Show that $\hat{\tau} = \ln S_n$ is a consistent estimator of τ . Is it an unbiased estimator? You may use simulation to check this.