

Math 152 - Statistical Theory - Homework 9

write your name here

Due: 11/16/2018

Book problems:

9.2 - 2, 4, 6, 7, 8

(Note: convince yourself that the theorems in 9.2 hold for #2 & 4.)

9.3 - 3, 6

R problem

An unethical experimenter desires to test the following hypotheses:

$$H_0 : \theta = \theta_0$$

$$H_1 : \theta \neq \theta_0$$

She draws a random sample X_1, X_2, \dots, X_n from a distribution with the p.d.f. $f(x|\theta)$, and carries out a test of size α_0 . If this test does not reject H_0 , she discards the sample, draws a new independent random sample of n observations, and repeats the test based on the new sample. She continues drawing new independent samples in this way until she obtains a sample for which H_0 is rejected.

- (a) What is the overall size of this testing procedure?
- (b) If H_0 is true, what is the expected number of samples that the experimenter will have to draw until she rejects H_0 ?
- (c) Do a simulation in R to corroborate your answer to (b). Assume the X_i are normally distributed with mean μ unknown and variance 1. Use $\alpha_0 = 0.05$. Figure out a way to display your results so that they form part of a convincing argument. (If you tell me what you want to display, I'm happy to tell you the R code to display it.)