Exercises 2nd Week

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Exercise 1

A statistic $T = T(X)$ is a sufficient statistic for θ if it can be computed without knowing the value of θ	T	F

Exercise 2

Let $(X_1, \ldots, X_n)$ be independent identically distributed random variables from the Cauchy distribution, with p.d.f.

$$f(x) = \frac{1}{\pi(x - \theta)^2}$$

1. Find a sufficient statistics for θ

Exercise 3

Let $(X_1, \ldots, X_n)$ be a random sample of i.i.d. random variables distributed as follows:

$$f(x; \theta) = \frac{\theta 2^\theta}{x^{\theta+1}} \qquad x > 2$$

1. Show that $\sum_i log(X_i)$ is a sufficient statistics for θ

Exercise 4

Suppose that X_1 and X_2 are two independent Bernoulli random variables with parameter p; $0 < p < 1$. Show that the statistics $T = X_1 - X_2$ is not a sufficient statistics for p.

Exercise 5

Let $(X_1, \ldots, X_n)$ be a random sample from $Exp(\lambda)$, let's consider the statistic $T = I(X > 2)$ and show T is not a sufficient statistics for λ.

Exercise 6

Let $(X_1, \ldots, X_n)$ be a random sample from the pdf

$$f(x; \theta) = \frac{1}{\theta} \exp\left(1 - \frac{x}{\theta}\right) \qquad 0 < \theta < x$$

Find a sufficient statistic for parameter θ.