

# Exercises 2<sup>nd</sup> Week

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## Exercise 1

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

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## Exercise 2

Let  $(X_1, \dots, X_n)$  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  $\theta$

## Exercise 3

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

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

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

## 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  $(X_1, \dots, X_n)$  be a random sample from the pdf

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

Find a sufficient statistic for parameter  $\theta$ .