

STATISTICS APPLIED TO BUSINESS ADMINISTRATION
ACADEMIC YEAR 2023-2024
PRACTICAL EXERCISES 6 AND 7 (40 MINUTES)

Date: _____

Complete name:_____ ID number:_____

EXERCISE 1 (10 POINTS)

Let X be a r.v. una v.a. with probability density function given by:

$$f(x; \theta) = \sqrt{\theta} x^{\sqrt{\theta}-1}, \quad 0 < x \leq 1, \quad \theta > 0$$

We wish to test the null hypothesis $H_0 : \theta = 1$ against the alternative hypothesis $H_1 : \theta = 4$. In order to do so, a random sample of size $n = 1$ is taken (i.e., we observe X).

1. **(4 points)** For this test, find the form of the most powerful critical region for X .
2. **(3 points)** If $\alpha = 0.05$, find the most powerful critical region for this test.
3. **(3 points)** Compute the power for this test.

EXERCISE 2 (10 POINTS)

We wish to investigate if the distribution for the grades students have in a given course follows the theoretical model professors propose, under which $P(F) = 0.40$, $P(C) = 0.35$, $P(B) = 0.20$, $P(A) = 0.03$ and $P(A+) = 0.02$. In order to do so, a r.s. of size 400 has been taken, providing the following results: out of the 400 students in the sample, 180 obtained F, 130 obtained C, 70 obtained B, 14 obtained A and only 6 obtained A+.

At the 5% significance level, what is the decision on the basis of the result of the test? Remember that you should clearly state the type of test you are carrying out, establish the null and alternative hypothesis, provide the test statistic for this test and its corresponding distribution under the null hypothesis, and clearly indicate the rule of rejection and conclusion for this specific test.