

STATISTICS APPLIED TO BUSINESS ADMINISTRATION
ACADEMIC YEAR 2020-2021
PRACTICAL EXERCISES 6 AND 7 (30 MINUTES)

Date: _____

Complete name: _____ ID number: _____

EXERCISE 1 (10 POINTS)

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

$$f(x, \theta) = \frac{1}{\theta} e^{-\frac{x}{\theta}}, \quad x \geq 0, \quad \theta > 0$$

Based on a r.s. of size $n = 1$, X_1 , we wish to test the null hypothesis $H_0 : \theta = 2$ against the alternative hypothesis $H_1 : \theta = 1$.

1. **(4 points)** Find the most powerful critical region for this test and for the test statistic X_1 . We can assume that $\alpha = 0.10$.
2. **(2 points)** Compute the power for this test.
3. **(4 points)** If we decide to reject the null hypothesis if $X_1 \geq 5$, would this critical region and rejection rule define a more powerful test than the previous one for the stated significance level?

EXERCISE 2 (10 POINTS)

We wish to investigate if the distributions 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?