

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:

$$f(x, \theta) = \frac{1}{\theta^2} e^{-\frac{x}{\theta^2}}, \quad x \geq 0, \quad \theta > 0$$

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

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 $X_1 \leq 0.10$, 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)

A firm wishes to commercialize a new product and it is interested in knowing whether its product should be sold to the general public or, on the contrary, to a more specific age group. In order to decide on this issue, a random sample of 500 individuals was taken, recording both their age and their views on the product. The results of this study can be summarized as follows. Out of the 200 individuals with an age in the range between 18 and 30 years old, 130 claim that they liked the product, 40 indicated that they did not like the product and the remaining 30 did not have a clear opinion on it. Out of the 150 individuals with an age in the range between 31 and 50 years old, 85 claimed that they liked the product, 40 indicated that they did not like the product and the remaining 25 did not have a clear opinion on it. Out of the 150 individuals with an age over 50 years old, 75 claimed that they liked the product, 35 indicated that they did not like the product and the remaining 40 did not have a clear opinion on it. At the 5% significance level, test the null hypothesis that preferences for that product do not change with age.