

STATISTICS APPLIED TO BUSINESS ADMINISTRATION
ACADEMIC YEAR 2017-2018
PRACTICAL EXERCISES 6 AND 7 (30 MINUTES)

Date: _____

Complete name: _____ ID number: _____

EXERCISE 1 (10 POINTS) The following table includes information on the probability mass function a discrete r.v. X has under the null hypothesis ($P_0(x)$) and under the alternative hypothesis ($P_1(x)$).

X	0	1	2	3	4	5
$P_0(x)$	0	0.05	0.10	0.30	0.05	0.50
$P_1(x)$	0.30	0.20	0.30	0	0.10	0.10

A random sample of size $n = 1$ will be used to test the null hypothesis $H_0 : P(x) = P_0(x)$ against the alternative hypothesis $H_1 : P(x) = P_1(x)$.

1. **(3 points)** Would you include the point $X = \{3\}$ in the critical region? Explain why or why not.
2. **(3 points)** Would you include the point $X = \{0\}$ in the critical region? Explain why or why not.
3. **(4 points)** At the 10% significance level and providing all relevant details used to obtain the required response, find the most powerful critical region for this test, and compute its probability of type II error. **Remark:** Before providing an answer to this item, take into account your responses to the previous items in this exercise.

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 $P(\text{Failing}) = 0.40$, $P(\text{Passing}) = 0.35$, $P(\text{Good}) = 0.20$, $P(\text{Very Good}) = 0.03$ and $P(\text{Outstanding}) = 0.02$. 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 a Failing grade, 130 obtained a Passing Grade, 70 obtained Good grade, 14 obtained a Very good Grade and only 6 obtained an Outstanding Grade.

1. **(3 points)** What type of test would you perform to test the hypothesis of interest? Justify your response.
2. **(7 points)** At the 5% significance level, what is the decision on the basis of the result of the test?