

**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?