STATISTICS APPLIED TO BUSINESS ADMINISTRATION. ACADEMIC YEAR 2013-2014 SEMINAR 3 (60 MINUTES)

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EXERCISE 1 (5 POINTS)

The number of calls received each minute in a telephone switchboard (i.e., *centralita telefónica*) follows a Poisson distribution. We wish to test the null hypothesis $H_0 : \lambda = 2$, against the alternative hypothesis $H_1 : \lambda = 3$. In order to do so, a random sample of size $n = 2$, X_1, X_2 has been taken. We consider the test statistic: $Z = X_1 + X_2$.

1. **(2 points** Using the likelihood ratio test criterion, find the form of the most powerful critical region for this test of hypothesis and for the text statistic given by Z.

2. **(1 point)** At the 6 % significance level, find the exact critical region for this specific test of hypothesis.

3. **(1 point)** For the aforementioned significance level, compute the power for this test.

4. **(1 point)** If $x_1 = 3$ and $x_2 = 5$, what would be the decision of the test of hypothesis?

EXERCISE 2 (5 POINTS)

In a high performance sports centre for elite athletes authorities decided to put into practice or introduce three different training techniques (A, B and C) for athletes having similar athletic performance. After some testing training period, the actual performance for the different athletes was verified or assessed. That is, if they kept their performance level, if they improved it or if it worsened. In this way, three different random samples were taken, one for each training technique being tested (A, B and C), and the athletes' performance was studied. Results from the three samples are reported in the following table:

		Resulting performance		
		Same	Improves	Worsens
Training techinque	A	20	14	12
	B	15	15	15
	C	15	16	13

At the $\alpha = 2.5\,\%$ significance level, and based on the results reported in the table above, test the null hypothesis of homogeneity for the three different training techniques under study. You should write down the null and alternative hypotheses, the test statistic together with its distribution, as well as the decision rule for the aforementioned test of hypothesis. Likewise, provide all relevant details about the computation of the theoretical probabilities required for this test.

Remark: This piece of paper should be handed in together with your solutions to the aforementioned exercises. You should also write, both on this piece of paper and in the solutions you provide, the names of the students in your group that have actively participated in this seminar activity.