STATISTICS APPLIED TO BUSINESS ADMINISTRATION
SEMINAR 6 (1 hour)

Date: _____

Complete name:_____ ID number:_____

Complete name:_____ ID number:_____

Complete name:_____ ID number:_____

Complete name:_____ ID number:_____

Complete name:_____ ID number:_____

EXERCISE 1 (4 POINTS)

We wish to estimate the daily mean sales for a given commercial store, where it is assumed that the daily sales follow a normal distribution with standard deviation equal to 500 euros. With regard to these settings, you should answer the following items, including the required details in the provided solution.

1. **(1 point)** What should be the minimum sample size for a s.r.s. with replacement (i.e., the number of days in which sales are recorded) in order to be able to obtain an estimate of the daily mean sales with a 95 % confidence level and absolute error or precision no larger than 50 euros?

2. **(1.5 points)** If for the sample in the previous item we obtain a sample mean of 3000 euros, what would be the 95 % confidence interval for the amount of daily mean sales?

3. **(1.5 points)** A given firm has two independent stores, similar to the one described above, having distributions for their daily sales that can be assumed to be independent from each other. Two independent s.r.s. of equal size, with sample sizes equal to the one obtained in item 1) of this exercise, are taken for these two stores, providing sample means of 3000 and 3500 euros, respectively. At the 5 % significance level, can we accept the null hypothesis that both stores have the same daily mean sales?

EXERCISE 2 (3 POINTS)

A firm devoted to the growing and distribution of oranges is aware that people prefer those types of oranges having similar sizes; that is, those types presenting a small size dispersion or variability. Because of this, the firm is interested in testing if the diameter standard deviation for a given type of oranges is smaller than or equal than 2 cm. In order to do so, a s.r.s. of size 31 is taken, providing a sample standard deviation of $s = 2.2$.

1. **(1.5 points)** At the 5 % significance level and if it is assumed that the diameter of the oranges follows a normal distribution, what would be the decision of the aforementioned test of hypothesis?

2. **(1.5 points)** The firm is thinking about starting the production of a different type of oranges, so that, in this way, they can try to grow oranges having a smaller diameter dispersion or variability. Because of this, they wish to test the null hypothesis that the dispersion is the same for both types of oranges (i.e., the new and the previous ones), against the alternative hypothesis that the new type has a smaller diameter dispersion. In order to do so, a s.r.s. of size 41 for the new type of oranges is taken, providing a diameter standard deviation equal to 2.1 cm. At the 5 % significance level, and based on the information provided in the sample, what would be the decision of this test and, thus, what would be the firm's conclusion about the diameter variability for the new type of oranges?

EXERCISE 3 (3 POINTS)

Large retail stores are thinking about the possibility of establishing a new service for their clients. This new service would be a profitable one if at least 40 % of their clients are interested in it. In order to take a final decision on this issue, a s.r.s. of 200 clients is taken, and 50 of them indicated that they would be interested in having this new service. Based on this information, the stores wish to test the null hypothesis that the new service is a profitable one.

1. **(1.5 points)** At the approximate 5 % significance level, what would be the stores' decision on this issue?

2. **(1.5 points)** Obtain an approximate 95 % confidence interval for the proportion of clients that would be interested in having this new service.

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.