ESTADÍSTICA II
EXERCISES CHAPTER 2
ACADEMIC YEAR 2010/11

1. The lifetime of 25 randomly selected fluorescent tubes manufactured by a certain company is, on average, 1750h, with the standard deviation (quasi-standard deviation) of 120h.

   If μ is the mean lifetime of all fluorescent tubes produced by the company, test the null hypothesis $\mu = 1600$ against the alternative $\mu \neq 1600$, at a 5% significance level.

2. A given brand of toasters is supposed to have a mean lifetime of at least 850h, where the toasters' lifetime follows a normal distribution with the standard deviation of 120h. We select 64 toasters from a batch and we find that their mean lifetime is 750h. At a 95% confidence level, should we reject the batch because it does not satisfy the given standard?

3. A report by the Association of Airlines suggests that the mean price of an airfare between the Canary Islands and the Iberian Peninsula is no more than 120 euros. The standard deviation among the airfares is 40 euros. A random sample of 100 passengers travelling between these two places is selected and yields the average ticket price of 128 euros. At a 10% significance level, can we trust the claim of the report? Would the conclusions change if we used a 1% significance level?

4. It is thought that one in ten male shows some sort of symptoms of colour blindness.

   (a) Among 400 randomly selected males, 50 show symptoms of colour blindness. At a 10% significance level, can we reject the above mentioned claim?

   (b) With the same sample as in a), would we arrive at the same conclusion if we used a significance level of 2%?

5. Ten years ago, the proportion of the populations reading magazine LA CIUDAD was 35%. To find out if this proportion is the same nowadays, we take a random sample of 225 people - only 64 of whom tell us that they read LA CIUDAD.

   - (a) If $\alpha = 0.05$, can we say that the proportion of readers of LA CIUDAD has decreased?
   - (b) Would our conclusion stay the same if we used a 1% level?

6. It is believed that the daily leisure time of Bachillerato students follows a normal distribution with the mean of 350min and standard deviation of 60min. To test this hypothesis we select a random sample of 100 students and obtain the average daily leisure time of 320min. At a 10% significance level, what can we conclude?

7. The bosses of a certain company think that the mean time that the employees spend eating their 'elevenses' exceeds 15min. The trade union does not agree with the bosses' claim and decides to carry out a survey with 35 randomly selected employees, whose 'elevenses' lasted on average 7min with the standard deviation (quasi-standard deviation) of 2min. At a 0.05 significance level, can we believe the bosses' claim?

8. A professor of Bachillerato claims that the percentage of the student-smokers in her school does not exceed 15%. If among 60 randomly selected students we find 12 smokers:

   - (a) Can we accept the professor's conjecture at a 0.01 significance level?
   - (b) Would the conclusion be the same if we used a 90% confidence level?

9. It is thought that 30% of the items produced by a given machine are defective. We take a random sample of 100 items and find that 28 of them are defective. Carry out a hypothesis test at a 95% confidence level to assess the claim.

10. A survey of 24 employees of a company revealed that the mean time that they had spent in employment was 6.5 years with the standard deviation (quasi-standard deviation) of 4 years. Does this sample data provide enough evidence to accept the claim (at a 5% level) that the mean time spent in employment in this company is less than or equal to 6 years?

11. Following the constitutional law of a certain country, a political party needs at least 5% of the votes to get to the Parliament. In a random sample of 1000 voters, 36 declare their support for Party A in the upcoming elections.

- (a) At a 5%, will Party A have its representatives in the Parliament?
- (b) What would be the answer in a) if we changed the significance level to 1%?