



Unit 7: Inferential Tools. Distributions associated with sampling

A. Class exercises

TABLES2 Using the tables of the chi-square and Student's t distributions, calculate the following values:

- a) $P(3.9403 < \chi_{10}^2 < 18.307)$.
- b) Value of the first decile (d_1) for the chi-square distribution with 6 df.
- c) $P(\chi_{14}^2 > c) = 0.05$.
- d) Value of the ninth decile for the t distribution with 8 df.
- e) $P(|t_{10}| < k) = 0.95$.

[From *Análisis de de datos Económicos II. Métodos inferenciales*, Problem 6.1, p. 341-342]

SHOPS The monthly income (X , in thousand euros) of the firms in a business sector has a normal distribution with mean 600 and standard deviation 30. Calculate the probability that, for a random sample of 16 companies, the sample variance of monthly incomes exceeds 512.

[From CASAS, JM et al (1998): *Problemas de Estadística*, problem 5.9, p. 281]



B. Proposed exercises

TABLES3 Using the tables obtain the following probabilities and values:

- a) $P(|t_{10}| < k) = 0.95$
- b) $P(t_{12} < -3.5495)$
- c) $P(\chi_{14}^2 > c) = 0.05$
- d) $P(\chi_{10}^2 \leq c) = 0.9$

RESULTS:

a) $k = 2.2281$. b) 0.002 . c) 23.6848 . d) 15.9872 .

PACKAGING The packaging process of a pharmaceutical product ensures that the packaged dose (X) is normally distributed with dispersion $\sigma = 2$. If we investigate a sample of 100 containers, what is the probability that the sample average of the doses deviates from its expectation by more than 0.4 mg?

[From *Análisis de de datos Económicos II. Métodos inferenciales*, Problem 6.6, p. 346-347]

RESULT: $P(|\bar{X}_{100} - \mu| > 0.4) = 0.0456$