

EXAM OF STATISTICS (PROBABILITY AND RANDOM VARIABLES)

Pharmacy/Biotechnology 1st year

Version A

January 18, 2021

Name:

DNI:

Group:

Duration: 1 hour.

- (3.5 pts.) 1. A test to detect prostate cancer produces 1% of false positives and 0.2% false negatives. It is known that 1 in 400 males suffer this type of cancer.
- (a) Compute the sensitivity and the specificity of the test.
 - (b) If a male got a positive outcome in the test, what is the chance of developing cancer?
 - (c) Compute and interpret the negative predictive value.
 - (d) Is this test better to predict or to rule out the cancer?
 - (e) To study whether there is an association between the practice of sports and this type of cancer, a sample of 1000 males was drawn, of which 700 practiced sports, and it was observed that there were 2 males with cancer in the group of males who practiced sports, and there were 3 males with cancer in the group of males who did not practice sports. Compute the relative risk and the odds ratio and interpret them.
- (3 pts.) 2. The probability that a child of a mother with the color-blind gene and a father without the color-blind gene is a color-blind male is 0.25. It is also known that in a population there is one color-blind male for every 5000 males.
- (a) If this couple has 5 children, what is the probability that at most 2 of them are color-blind males?
 - (b) If this couple has 5 children, and the gender of the children is equiprobable, what is the probability that 3 or more are females?
 - (c) In a random sample of 10000 males of this population, what is the probability that more than 3 are color-blind males?
- (3.5 pts.) 3. The primate cranial capacity follows a normal distribution with mean 1200 cm^3 and standard deviation 140 cm^3 .
- (a) Compute the probability that the cranial capacity of a primate is greater than 1400 cm^3 .
 - (b) Compute the probability that the cranial capacity of a primate is exactly 1400 cm^3 .
 - (c) Above what cranial capacity will 20% of primates be?
 - (d) Compute the interquartile range of the cranial capacity of primates and interpret it.