

EXAM OF STATISTICS (PROBABILITY AND RANDOM VARIABLES)

Pharmacy/Biotechnology 1st year

Version B

January 17, 2022

Name:

DNI:

Group:

Duration: 1 hour.

- (3 pts.) 1. A diagnostic test for a disease with a prevalence of 10% has a positive predictive value of 40% and negative predictive value of 95%.
- (a) Compute the sensitivity and the specificity of the test.
 - (b) Compute the probability of a right diagnose.
 - (c) What must be the minimum sensitivity of the test to be able to diagnose the disease?

- (2 pts.) 2. To study the effectiveness of two antigen tests for the COVID both tests have been applied to a sample of 100 persons. The table below shows the results:

Test A	Test B	Num persons
+	+	8
+	−	2
−	+	3
−	−	87

Define the following events and compute its probabilities:

- (a) Get a + in the test A .
- (b) Get a + in the test A and a − in the test B .
- (c) Get a + in some of the two tests.
- (d) Get different results in the two tests.
- (e) Get the same result in the two tests.
- (f) Get a + in the test B if we got a + in the test A .

Are the outcomes of the two tests independent?

- (5 pts.) 3. It is known that the life of a battery for a peacemaker follows a normal distribution. It has been observed that 20% of the batteries last more than 15 years, while 10% last less than 12 years.
- (a) Compute the mean and the standard deviation of the battery life.
Remark: If you are not able to compute the mean and the standard deviation, use a mean of 14 years and a standard deviation of 1.5 years for the following parts.
 - (b) Compute the fourth decile of the battery life.
 - (c) If we take a sample of 5 batteries, what is the probability that more than half of them last between 13 and 14 years?
 - (d) If we take a sample of 100 batteries, what is the probability that some of them last less than 11 years?