

EXAM OF STATISTICS (PROBABILITY AND RANDOM VARIABLES)

2nd Physiotherapy

Version A

May, 31 2018

Name:

DNI:

Group:

Duration: 1 hour and 30 minutes.

- (2.5 pts.) 1. An ultrasonic technique is used to diagnose a disease with a sensitivity of 91% and a specificity of 98%. The prevalence of the disease is 20%,
- (a) If we apply the technique to an individual and the outcome is positive, what is the probability of having the disease for that individual?
 - (b) If the outcome was negative, what is the probability of not having the disease?
 - (c) Is this technique more reliable to confirm or to rule out the disease? Justify the answer.
 - (d) Compute the probability of having a correct diagnose with this technique.
- (2.5 pts.) 2. It is known that the femur length of a fetus with 25 weeks of pregnancy follows a normal distribution with mean 44 mm and standard deviation 2 mm.
- (a) Compute the probability that the femur length of a fetus with 25 weeks is greater than 46 mm.
 - (b) Compute the probability that the femur length of a fetus with 25 weeks is between 46 and 49 mm.
 - (c) Compute an interval (a, b) centered at the mean, such that it contains 80% of the femur lengths of fetus with 25 weeks.
- (2.5 pts.) 3. The probability that an injury A is repeated is $4/5$, the probability that another injury B is repeated is $1/2$, and the probability that none of them are repeated is $1/20$. Compute the probability of the following events:
- (a) At least one injury is repeated.
 - (b) Only injury B is repeated.
 - (c) Injury B is repeated if injury A has been repeated.
 - (d) Injury B is repeated if injury A has not been repeated.
- (2.5 pts.) 4. A physical therapy clinic opens 6 hours a day and the average number of patients that arrive to the clinic is 12 a day.
- (a) Compute the probability of arriving more than 4 patients in 1 hours.
 - (b) If the clinic has 4 physiotherapists and each of them can treat one patient per hour, what is the probability that a day there was some hour in which some patient can not be attended? How many physiotherapists must be in the clinic to guarantee that this probability is less than 10%?