EXAM OF STATISTICS
(PROBABILITY AND RANDOM VARIABLES)

2nd Physiotherapy **Version A** **June, 19 2020**

Name: DNI: Group:

Duration: 1 hour.

(3 pts.) 1. Two symptoms of COVID-19 are fever and cough. We know that 30% of people with COVID-19 cough and 20% have fever and cough. Also, if somebody with COVID-19 have fever then the probability of coughing 0.5.

(a) Construct the probability tree for the sample space of the random experiment consisting in picking a random person with COVID-19 and measuring the symptoms that he or she have.

(b) Calculate the probability of having any of the symptoms.

(c) Calculate the probability of having only cough.

(d) Calculate the probability of having only fever.

(e) Calculate the probability no fever nor cough.

(f) Are the symptoms dependent or independent?

(4 pts.) 2. The sensitivity and specificity of a diagnostic test are 0.58 and 0.01, respectively, and the probability of a true positive is 0.02.

(a) Calculate the prevalence of the disease.

(b) Calculate predictive values.

(c) Is the test more useful to rule out or confirm the disease?

(d) If we have 10 non-sick patients, what is the probability that more than 9 have a misdiagnosis?

(e) If we have 60 patients, what is the probability that at least two of them have a correct diagnosis?

(3 pts.) 3. The time required to cure a basketball injury with a rehabilitation technique follows a normal distribution with quartiles $Q_1 = 22$ days and $Q_2 = 25$ days.

(a) Calculate the mean and standard deviation of the curation time.

(b) If a player has just been injured and has to play a match in 30 days, what is the probability that he will miss it?

(c) Calculate the interquartile range of the curation time distribution.