

EXAM OF STATISTICS (PROBABILITY AND RANDOM VARIABLES)

2nd Physiotherapy

Version A

June, 29 2021

Name:

DNI:

Group:

Duration: 1 hour.

- (2.5 pts.) 1. Let A and B be two events of a same sample space, such that $P(A) = 3/8$, $P(B) = 1/2$ and $P(A \cap B) = 1/4$. Compute the following probabilities:
- (a) $P(A \cup B)$.
 - (b) $P(\bar{A})$ and $P(\bar{B})$.
 - (c) $P(\bar{A} \cap \bar{B})$.
 - (d) $P(A \cap \bar{B})$.
 - (e) $P(A|B)$.
 - (f) $P(A|\bar{B})$.
 - (g) Are A and B compatible? Are A and B dependent?
- (4 pts.) 2. A blood analysis detects a disease in 94% of cases when the disease exists. However, the test produce a false positive in 6% of the patients. We also know that 10% of the population suffer the disease.
- (a) What is the probability that a random person has the disease if the outcome of the test is positive? Would you diagnose the disease with that probability?
 - (b) Compute the negative predictive value and interpret it. Is this test better to confirm or to rule out the disease?
 - (c) Compute the probability of a wrong diagnostic.
 - (d) If we pick a sample of 11 patients from this population, what is the probability of a wrong diagnostic in more than 2 patients?
Remark: Use 0.1 as the probability of a wrong diagnostic if you do not know how to compute it.
- (3.5 pts.) 3. The thoracic perimeter of a male population of ages between 25 and 40 follows a normal distribution of mean 102 cm. It is also known that 20% of the population have a perimeter above 111 cm.
- (a) Compute the standard deviation of the thoracic perimeter.
Remark: If you do not know how to compute it, use a standard deviation of 9.5 cm for the next parts.
 - (b) Compute the interquartile range of the thoracic perimeter distribution.
 - (c) What is the probability that in a sample of 100 males from this population, there are at most 3 with a thoracic perimeter less than 82 cm?