

### **Exercise 1**

Two symptoms of bronchitis are chest congestion (CC) and fever (F). We know that 30% of people with bronchitis have chest congestion and 20% have congestion and fever. Also, if somebody with bronchitis has fever then the probability of having congestion is 0.5.

1. Calculate the probability of having **any** of the symptoms.
2. Calculate the probability of having **only** congestion.
3. Calculate the probability of having **only** fever.
4. Calculate the probability of no fever nor congestion.
5. Are the symptoms dependent or independent?

### **Exercise 2**

A new test is used to diagnose a disease with a sensitivity of 92% and a specificity of 98%. The prevalence of the disease is 19%,

1. If we apply the test to an individual and the outcome is positive, what is the probability of having the disease for that individual?
2. If the outcome was negative, what is the probability of not having the disease?
3. Is this test more reliable to confirm or to rule out the disease? Justify the answer.
4. Compute the probability of having a correct diagnosis with this test.

### **Exercise 3**

An international company is manufacturing pregnancy tests. It is known that 5% of the tests present some problems and they must be discarded.

1. If we select one box with 24 tests, what is the probability that 2 or more 2 are defective?
2. Considering that the amount of test made in Spain is 4000 in a day, what is the probability of discarding 3 or more?

### **Exercise 4**

In people with diabetes, the glucose levels follow a normal distribution with quartiles:  $Q_1 = 90.59$  mg/100ml and  $Q_2 = 106$  mg/100 ml

1. Calculate the mean and standard deviation of the glucose levels distribution.
2. The threshold concentration to be considered in risk of having diabetes is 160 mg/100ml. With this distribution, what percentage of people would be under risk?
3. Calculate the interquartile range of the concentration of glucose.
4. Knowing the limit of glucose to be healthy (160mg/100ml), from a sample of 10 people, calculate the probability that 7 of them are healthy.