

Sujet n°8

PROBABILITIES

Please do not write on the subject paper and don't forget to give back the examination paper at the end of the test.

A doctor gives a female patient a test for a particular cancer. Before receiving the results of the test, the only evidence the doctor has to go on is that 1 woman in 1000 has this cancer.

Experience has shown that, in 99 percent of the cases in which this type of cancer is present, the test is positive ; and in 95 percent of the cases in which it is not present, the test is negative.

We label C, the event « the woman has this type of cancer » and T the event « the test is positive »

All values have to be given to 5 decimal places (round if needed).

1. Build a tree showing the situation.
2. Determine the probability of the event « the woman has cancer and her test is positive ».
3. Compute the probability of the event « the test is positive ».
4. If the test turns out to be positive, what probability should the doctor assign to the event that cancer is present ?
5. Compute the probability of false negative tests (probability that the woman doesn't have cancer knowing that her test is positive)
6. What can you conclude about this test ?