### BI Questions

### Q.1 ) We consider a medical diagnosis task. We have knowledge that over the entire population of people 0.8% have cancer. There exists a (binary) laboratory test that represents an imperfect indicator of this disease. That test returns a correct positive result in 98% of the cases in which the disease is present, and a correct negative results in 97% of the cases where the disease is not present.

### (a) Suppose we observe a patient for whom the laboratory test returns a positive result. Calculate the a posteriori probability that this patient truly suffers from cancer.

### (b) Knowing that the lab test is an imperfect one, a second test (which is assumed to be independent of the former one) is conducted. Calculate the a posteriori probabilities for cancer and ￢cancer given that the second test has returned a positive result as well.

### Q.2) Suppose that you are worried that you might have a rare disease. You decide to get tested, and suppose that the testing methods for this disease are correct 99 percent of the time (in other words, if you have the disease, it shows that you do with 99 percent probability, and if you don't have the disease, it shows that you do not with 99 percent probability). Suppose this disease is actually quite rare, occurring randomly in the general population in only one of every 10,000 people.

### If your test results come back positive, what are your chances that you actually have the disease?