MathsNET
A joined up approach to teaching and learning mathematics

Bayes theorem and independence

0.1 Level 1

Consider the following statement from the question "10 below to generate 40 random variables that represent each patient visiting the doctor. These random variables should be equal to one if the patient has the disease and they should be 0 otherwise. Remember that 10 patients visiting the doctor who have the disease changes as the number of patients that the doctor has seen increases.

0.2 Level 2

Now consider the following statement from the question "the test is 99 comes to see the doctor the test will give a positive result in 99 will obtain from diseased individuals when he tests 40 patients. Plot a graph showing how the number of patients visiting the doctor who have the disease and who have a positive test result changes as the number of patients that the doctor has seen increases. Note down the number of final number of patients who get a positive result for the test because they have the disease that you obtain by performing this exercise.

0.3 Level 3

Now consider the following statement from the question: "the test gives a false positive result in 5 comes to see the doctor the test will give a positive result in 5 the number of positive test results the doctor will obtain from healthy individuals when he tests 40 patients. Plot a graph showing how the number of patients visiting the doctor who get a false positive for the test changes as the number of patients that the doctor has seen increases. Note down the number of final number of patients who get a false positive result for the test and compare this value with the number of patients who had a true positive that you calculated in the previous exercise.

0.4 Level 4

Now combine the results that you obtained in the previous two exercises and generate a graph showing how the estimate of the conditional probability of getting a positive test result because the patient actually has the disease changes as the number of patients that the doctor has seen increases. Just to remind you the full statement of the problem is as follows: consider a test to detect a disease that 10

0.5 Level 5

Now suppose for the sake of argument that the test was completely useless and that having a positive test result and having the disease were independent events. Modify the code that you have just written to make this the case. Once again plot a graph showing how the fraction of individuals who get a positive test result because they actually have the disease changes as the number of patients the doctor has seen increases. What value does this fraction converge to in this particular case?