

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY KOTTAYAM

Subject: Statistical Foundation for DS (DSC511)

Class work problems-1

An insurance company believes that people can be divided into two classes: those who are accident prone and those who are not. The company's statistics show that an accident prone person will have an accident at some time within a fixed 1-year period with probability 0.4, whereas this probability decreases to 0.2 for a person who is not accident prone. If we assume that 30 percent of the population is accident prone, (i) what is the probability that a new policy holder will have an accident within a year of purchasing a policy? (ii) Suppose that a new policyholder has an accident within a year of purchasing a policy. What is the probability that he or she is accident prone?

A laboratory blood test is 95 percent effective in detecting a certain disease when it is present. However, the test also yields a “false positive” result for 1 percent of the healthy persons tested. (That is, if a healthy person is tested, then with probability 0.01, the test result will imply that he or she has the disease) If 0.5 percent of the population actually has the disease, what is the probability that a person has the disease given that the test result is positive?

A 60 percent of new drivers have had driver education. During their first year, new drivers without driver education have probability 0.08 of having an accident, but new drivers with driver education have only a 0.05 probability of an accident. What is the probability a new driver has had driver education, given that driver has had no accident in the first year?

Urn 1 contains one white and two black marbles, urn 2 contains one black and two white marbles, and urn 3 contains three black and three white marbles. A die is rolled. If a 1, 2, or 3 shows up, urn 1 is selected; if a 4 shows up, urn 2 is selected; and if a 5 or 6 shows up, urn 3 is selected. A marble is then drawn at random from the urn selected. What is the probability that the marble drawn is white? What is the conditional probability of selecting urn 2 given that the marble drawn is white?