Introduction to Probability

Tutorial 4

1. Two cards are chosen from a pack of cards *without replacement*. Calculate the probabilities:

   (a) Both are picture cards.

   (b) Both are from red suits.

   (c) One card is from a red suit and one card is from a black suit.

   Repeat the above calculation when the second drawing is made *with replacement*.

   Compare your answers in the 2 cases.

2. Show that if the events A and B are independent events, then so are the events

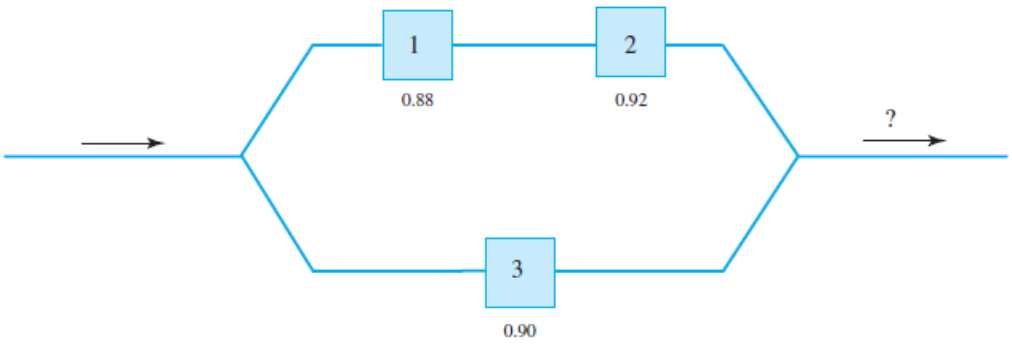
   (a) A and B' (b) A' and B (c) A' and B'

3. Suppose that an insurance company insures its clients for flood damage to the property. Can the company reasonably expect that the claims from its clients will be independent of each other?

4. (a) If a fair die is rolled 5 times, what is the probability that the numbers obtained are all even numbers?

   (b) If a fair die is rolled 3 times, what is the probability that the 3 numbers obtained are all different?

5. Consider the network given in the figure with three switches. Suppose that the switches operate independently of each other and that switch 1 allows a message through with probability 0.88, switch 2 allows a message through with probability 0.92 and switch 3 allows a message through with probability 0.90. What is the probability that a message will find a route through the network?



6. (Monty Hall problem, for fun only) Suppose you are on a game show, and you are given the choice of three doors: Behind one door is a car; behind the others, goats. You pick a door, say Door 1, and the host, who knows what is behind the doors, opens another door, say Door 3, which has a goat. He then says to you, "Do you want to pick Door 2?" Is it to your advantage to switch your choice?