

**IIIT-Bangalore**  
**Course - Probability and Statistics**  
**Problem Set 2**

1. Let  $A, B$  be two independent events. Prove that:
  - (i)  $A, \bar{B}$  are independent
  - (ii)  $\bar{A}, \bar{B}$  are independent
2. Let  $A, B, C$  be three events such that  $A, B$  are independent;  $B, C$  are independent. Does it imply that  $A, C$  are independent?
3. An urn contains 4 white and 6 black balls. Two balls are drawn successively without replacement. If the first ball is seen to be white, what is the probability that the second ball is also white? (Ans.  $1/3$ )
4. Two urns contain respectively 2 white, 1 black balls and 1 white, 5 black balls. One ball is transferred from the first urn to the second urn and then a ball is drawn from the second urn. What is the probability that the ball drawn is white? (Ans.  $5/21$ )
5. There are two identical urns containing 4 white and 3 red balls; 3 white and 7 red balls. An urn is chosen at random and a ball is drawn from it. Find the probability that the ball is white. If the ball drawn is white, what is the probability that it is from the first urn? (Ans.  $40/61$ )
6. There are three identical boxes each provided with two drawers. In the first each drawer contains a gold coin; in the third each drawer contains a silver coin; in the second one drawer contains a gold and other a silver coin. A box is selected at random and of the drawers is opened. If a gold coin is found what is the probability that the box chosen is the second one? (Ans.  $1/3$ )
7. A letter is known to have come from either from TATANAGAR or from CALCUTTA. Only two consecutive letters TA are visible on the envelope. What is the probability that the letter is from CALCUTTA? (Ans.  $4/11$ )
8. A man is known to speak the truth three out of four. He throws a die and reports that it is 6. Find the probability that it is actually 6. (Ans.  $3/8$ )

9. A locker can be opened by dialling fixed three-digit code between 000 and 999. A stranger who doesn't know the code tries to open the locker by dialling 3-digit numbers at random. Find the probability that he succeeds at the  $k$ -th trial. (Ans.  $1/1000$ )
10. The chance that a doctor will diagnose a certain disease is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of the doctor who had the disease dies. What is the probability that the disease was diagnosed correctly? (Ans.  $6/13$ )