Probability and Statistics (MA1002)
Unit-1 Tutorial Sheet
(Up to Bayes Theorem)

1. A committee of 4 people is to be appointed from 3 officers of the production department, 4 officers of the purchase department, two officers of the sales department and 1 chartered accountant. Find the probability of forming the committee in the following manner: There must be one from each category; (ii) It should have at least one from the purchase department; (iii) The chartered accountant must be in the committee.

2. From 25 tickets, marked with the first 25- numerals, one is drawn at random. Find the chance that (i) it is a multiple of 5 or 7; (ii) it is a multiple of 3 or 7.

3. An urn contains 4 tickets numbered 1, 2, 3, 4 and another contains 6 tickets numbered 2, 4, 6, 7, 8, 9. If one of the two urns is chosen at random and a ticket is drawn at random from the chosen urn, find the probabilities that the ticket drawn bears the number (i) 2 or 4; (ii) 3; (iii) 1 or 9.

4. A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box, at random. Find the probability that among the balls drawn there is at least one ball of each color.

5. A problem in Statistics is given to the three students A, B and C whose chances of solving it are 1/2, 3/4, and 1/4 respectively. What is the probability that the problem will be solved if all of them try independently?

6. Three groups of children contain respectively 3 girls and 1 boy, 2 girls and 2 boys, and 1 girl and 3 boys. One child is selected at random from each group. Show that the chance that the three selected consist of 1 girl and 2 boys is 13/32.

7. Three newspapers A, B and C are published in a certain city. It is estimated from a survey that 20% read A, 16% read 8, 14% read C, 8% read A and B, 5% read A and C, 4% read B and C and 2% read all the three newspapers. What is the probability that a normally chosen person (i) does not read any paper; (ii) does not read C; (iii) reads A but not B; (iv) reads only one of these papers; (v) reads only two of these papers.

8. A and B throw alternately with a pair of ordinary dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, show that his chance of winning is 30/61.

9. A consignment of 15 record players contains 4 defectives. The record players are selected at random, one by one, and examined. Those examined are not put back. What is the probability that the 9th one examined is the last defective?

10. What is the probability that at least two out of 30 students have the same birthday?

11. An urn contains 6 white, 4 red and 9 black balls. If 3 balls are drawn at random, find the probability that
    (a) one is of each color.
    (b) none is red.
    (c) at least one is white.

12. The contents of urns, I, II, and III are as follows: 1 white, 2 black and 3 red balls; 2 white, 1 black and 1 red balls; and 4 white, 5 black and 3 red balls. One urn is chosen at random, and two balls drawn from it. They happen to be white and red. What is the probability that they come from urns I, II or III?

13. From a vessel containing 3 white and 5 black balls, 4 balls are transferred into an empty vessel. From this vessel a ball is drawn and is found to be white. What is the probability that out of four balls transferred 3 are white and 1 is black?

14. Puja and Paul are two weak students of Statistics and their chances of solving a problem in Statistics correctly are 1/6 and 1/8 respectively. If the probability of their making a common error is 1/525 and they obtain the same answer, find the probability that their answer is correct.

15. In answering a question on a multiple choice test a student either knows the answer or he guesses. Let p be the probability that he knows the answer and 1-p the probability that he guesses. Assume that a student who guesses at answer will be correct with probability 1/5, where 5 is the number of multiple-choice alternatives. What is the probability that a student knew the answer to a question given that he answered it correctly?