MA4413 and MA4704

Introduction to Probability

August 17, 2013

Dice Questions

1. Suppose a pair of fair dice is thrown.

   (a) What is the probability of getting a sum of 9 from two throws of a dice

   Find the probability that the sum is 10 or greater if

   (b) a 5 appears on the first die,

   (c) a 5 appears on at least one of the dice.

2. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5

Urn Questions

3. Suppose an urn contains seven white, four black and three red beads. Three beads are picked at random without replacement. Find the probability that all three beads are the different in colour. at least two beads are the same colour.

4. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

5. Based on the following information, express q in terms of p and r.

   - Suppose that 4 numbers have a mean of p

- Suppose that five other numbers have a mean of q.
- These nine numbers have a mean of r.

Independent Events

6. Competitors A and B fire at their respective targets. The probability that A hits a target is 1/3 and the probability that B hits a target is 1/5. Find the probability that:

   i. (2 marks) A does not hit the target,

   ii. (2 marks) both hit their respective targets,

   iii. (2 marks) only one of them hits a target,

   iv. (2 marks) neither A nor B hit their targets.

7. Four Students work independently on a mathematical problem. The probability that the four students have of solving the problem are as follows:

8. An IT consultant is responsible for three software engineering projects X, Y and Z. He knows that the probability of completing project X in time is 0.99, for project Y this probability is 0.95 and for project Z it is 0.80.

   a What assumption do you need to make in order to calculate the probability of completing all three projects in time, from the information given?

   b Calculate the probability of completing all three projects in time.

   c Calculate the probability that only projects X and Y will be completed on time.

9. A doctor treating a patient issues a prescription for antibiotics and provides for two repeat prescriptions. The probability that the infection will be cleared by the first prescription is p_1 =0.6. The probability that successive treatments are successful, given that previous prescriptions were not successful are $p_2 = 0.5$, $p_3 = 0.4$. Calculate the probability that:

a a patient will require the third prescription,

b the patient is still infected after the third prescription,

c the patient is cured by the second prescription, given that the patient is eventually cured.

10. Two people look at the letters in the word discovery. Independently of each other, each person writes down two of the letters from the word discovery. What is the probability that

    (i) One person writes down two vowels and the other person

    (ii)

11. Three cards are drawn, one after the other, without replacement, from a pack of 52 playing cards. Find the probability that the

12. On completion of a programming project, three programmers from a team submit a collection of subroutines to an acceptance group.

    The following table shows the percentage of subroutines each programmer submitted and the probability that a subroutine submitted by each programmer will pass the certification test based on historical data.

Programmer	A	B	C
Proportion of subroutines submitted	0.40	0.35	0.25
Probability of acceptance	0.75	0.95	0.85

    i. (3 marks) What is the proportion of subroutines that pass the acceptance test?

    ii. (3 marks) After the acceptance tests are completed, one of the subroutines is selected at random and found to have passed the test. What is the probability that it was written by Programmer A?