COMP 2711 Discrete Mathematical Tools for Computer Science
2022 Fall Semester – Tutorial 5

Question 1: How many permutations of the 10 digits (0 through 9) either begin with the 3 digits 987, contain the digits 45 in the fifth and sixth positions, or end with the 3 digits 123?

Question 2: There are ten groups and each group has two people. They sit down in a row of twenty seats. How many ways are there that at least one group sits together? Your answer could be a summation of at most ten terms.

Question 3: This problem was posed by the Chevalier de Méré and was solved by Blaise Pascal and Pierre de Fermat.

(a) Find the probability of rolling at least one six when a fair die is rolled four times.

(b) Find the probability that a double six comes up at least once when a pair of dice is rolled 24 times. Answer the query the Chevalier de Méré made to Pascal asking whether this probability was greater than 1/2.

(c) Is it more likely that a six comes up at least once when a fair die is rolled four times or that a double six comes up at least once when a pair of dice is rolled 24 times?

Question 4: There is a type of cereal that contains a toy in each box. There are 10 types of toys, $T_1, T_2, \ldots, T_{10}$ and every box has probability $\frac{1}{10}$ of containing each possible toy, independently of every other box.

Your little brother buys a box of cereal each week for 20 weeks and keeps all of the toys that he finds.

(a) What is the probability that your brother has at least one copy of toy T_1 after 20 weeks?

(b) What is the probability that after 20 weeks your brother has collected *all* of the 10 different toys?