Assignment 2
Submission Deadline: 8 March, 2021

1. Assume that n people are seated in a random manner in a row of n seats. What is the probability that two particular people X and Y will be seated next to each other? **[2]**

2. A deck of 52 cards contains four aces. If the cards are shuffled and distributed in a random manner into four sets containing 13 cards each, what is the probability that all four aces will be in the same set? **[3]**

3. A box contains 24 balls, of which 2 are red and remaining white. If a person selects 10 balls at random, without replacement, what is the probability that both red balls will be selected?
[2]

4. Find the probability that n people ($n \leq 365$) selected at random will have n different birthdays.
[3]

5. Mr Narayanan is a civil engineer with Kerala government. He is asked to design an over bridge (sky way). The chance that his design is going to be faulty is 60% and the chance that his design will be correct is 40 %. The chance of the over bridge collapsing if the design is faulty is 90 %; otherwise, due to other causes, the chance of the over bridge collapsing is 20%. What is the chance that an over bridge built by Mr Narayanan will collapse? **[3]**

6. Which of the following events has the highest probability?

   A: At least one 6 appears when 6 fair dice are rolled.

   B: At least two 6's appear when 12 fair dice are rolled.

   C: At least three 6's appear when 18 fair dice are **[3]**

7. Suppose that a box contains one blue card and four red cards, which are labelled X, Y, Z, and W. Suppose also that two of these five cards are selected at random, without replacement.

   (i) If it is known that card X has been selected, what is the probability that both cards are red?

   (ii) If it is known that at least one red card has been selected, what is the probability that both cards are red? **[3]**

8. A bag contains one marble which is either green or blue, with equal probabilities. A green marble is put in the bag (so there are 2 marbles now), and then a random marble is taken out. The marble taken out is green. What is the probability that the remaining marble is also green? **[2]**

9. Suppose cards numbered one through ten are placed in a hat, mixed up, and then one of the cards is drawn. If we are told that the number on the drawn card is at least five, then what is the conditional probability that it is ten? **[2]**

10. A card player is dealt a 13-card hand from a well-shuffled, standard deck of cards. What is the probability that the hand has no cards of at least one suit? **[3]**