CSE 230 Assignment 2

Total Marks: 60

1. ***(3 marks)*** In a class, there are **12** male students and **10** female students. If **5** students are selected at random from section X, what is the probability that at most **3** females are selected?

2. Two of 10 marbles, labeled from 1 to 10, are picked from a bag without replacement.
   a. ***(2 marks)*** Write down the sample space of this experiment using the set builder method.
   b. ***(3 marks)*** What is the probability that the number on the second ball is smaller than the number on the first?
   c. ***(3 marks)*** What is the probability that the number on one ball is even and the other is odd.

3. Natasha loves to collect marbles of different colors. She has a jar where she stores all her marbles. In that jar she has **5** red marbles, **6** blue marbles and **8** purple marbles. If she pulls **3** marbles, what is the probability:
   a. ***(2 marks)*** that the marbles picked, without replacement, are in the order purple, red and blue?
   b. ***(2 marks)*** that the marbles picked, with replacement, are all purple in color?

4. ***(3 marks)*** A Coin is thrown 3 times .What is the probability that at least one head is obtained?

5. ***(3 marks)*** 9 students are seated at random in 3 rows of 3 desks. Let, A= "Anu and Mumu sit in the same row" and B = "Anu and Mumu sit at one of the four corner desks". Are A and B independent?

6. ***(3 marks)*** In a room full of 15 people, what is the probability that at least 2 people have the same birthday? Assume that all birthdays are equally likely (uniform distribution) and there are 365 days in the year.

7. ***(3 marks)*** How many children should a family plan to have so that the probability of having at least one child of each gender is at least **0.86**?

8. In Bangladesh, 40% of male smokers smoke cigars. In a sample of size 20 male smokers, what is the probability that
    a. ***(2 mark)*** Exactly **4** of them smoke cigars?
    b. ***(2 marks)*** At most **3** smoke cigars?
    c. ***(2 marks)*** At least **3** smoke cigars?
    d. ***(3 marks)*** What is the Expected value, Variance and Standard Deviation of the above random variable?

9. ***(4 marks)*** In a recent poll, **23%** of the respondents supported candidate A, **19%** supported candidate B, **13%** supported candidate C, and **45%** were undecided. Then **10** people are chosen at random. What is the probability that **3** people support candidate A, **4** support candidate B, **1** support candidate C and **2** are undecided?

10. **14%** of the vehicles driven on a bridge are SUVs. Richard, a toll collector, counts the number of vehicles until the first SUV crosses him. What is the probability he counts:
    a. ***(3 marks)*** At most **3** vehicles
    b. ***(3 marks)*** At least **4** vehicles

11. Customers arrive at a local store at a rate of **10** per hour.
    a. What is the probability that, in any **2.5** hour period, the number of customers arriving is: (i) ***(2 marks)*** exactly **15**
    (ii) ***(3 marks)*** at least **10**
    b. ***(3 marks)*** A customer arrives at the local store at 3:35pm. What is the probability that the next customer arrives before 7:40pm?

12. ***(6 marks)*** In a sample space of **175** left handed batsmen (LHB) and **200** right handed batsmen (RHB), it is assumed that **0.5%** of all LHB and **0.4%** of all RHB have trouble playing in-swinger delivery. What is the probability that exactly **1** batsman in the sample space faces difficulty playing an in-swinger?