Assignment-1

Max Marks: 15 Due date: 12 October 2021 (11: 59 PM)

1. **(3 Marks)** Given two sets A and B, write a program that performs the following tasks:
    a. Performs intersection of two sets
    b. Performs union of two sets
    c. Finds the set difference A – B.

2. **(1 Mark)** Bob is a naughty kid and has recently shifted to his new house. He has a staircase in his house which has n-steps. He thinks of climbing the stairs with either 1 step or 2 steps at a time. Considering the initial position of Bob to be in the bottom, write a program to return the number of ways in which Bob can reach the top.

3. **(2 Marks)** Given a function (0-1 matrix) on set {1, 2, 3, …, n}, write a program to check it is one-to-one and onto function.

4. **(2 Marks)** In the class, we have discussed that the set of rational numbers is countable, by giving an ordering of elements of the set (the ordering contains every element exactly once). Write a program to find the position of given rational number $\frac{a}{b}$ where a and b are integers such that $b \neq 0$. Further, note that the terms a and b are need not be minimum terms i.e., $\gcd(a, b) \neq 1$, like 255/366.

5. **(3 Marks)** Given a partial order relation $(S, \preccurlyeq)$, find the topological order of the elements of the set S.

6. **(2 Marks)** Given a relation R, using 0-1 matrix, verify whether it is anti-symmetric and transitive or not.

7. **(2 Marks)** Find the transitive closure of a relation R, given in 0-1 Matrix.