National University of Computer & Emerging Sciences, Karachi
Spring-2021 (CS-Department)

CS218 – Data Structures (DS)

Assignment # 1

Max Points: 20 **Due Date:** Saturday, March 13, 2021, 11 a.m.

Carefully read the following instructions!

- It should be clear that your assignment would not get any credit if the assignment is submitted after the due date. No assignment will be accepted after the due date.
- Strict action will be taken if submitted solution is copied from any other student.
- If you people find any mistake or confusion in assignment (Question statement), please consult before the deadline. After the deadline no queries will be entertained in this regard.
- For any query, feel free to email at: **basit.jasani@nu.edu.pk**
- **Submission:** Submission will only be accepted through GOOGLE CLASSROOM. Submit all your codes in a single folder name it as your Student ID **"KXX-XXXX"**. The folder will contain two text files as ***Q1.txt and Q2.txt*** with proper commenting of the code.

Question # 1 (Backtracking)

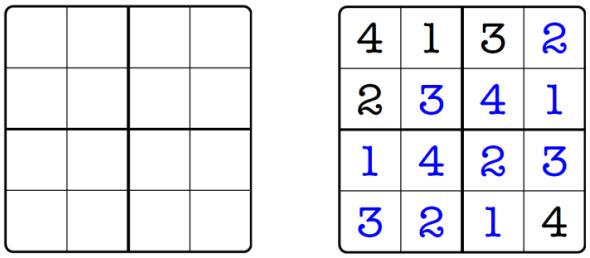
A two dimensional array of characters can be considered as a field. Each cell is either water 'W' or a tree 'T'. A forest is a collection of connected trees. Two trees are connected if they share a side i.e. if they are adjacent to each other. Your task is, given the information about the field, print the size of the largest forest. Size of a forest is the number of trees in it. See the sample case for clarity;

Sample Input:
5
TTTWW
TWWTT
TWWTT
TWTTT
WWTTT

Sample Output:
10

Question # 2 (Backtracking)

In a 2x2 Sudoku puzzle, there are 4 connected 2x2 grids and the objective is to fill the grid with numbers from the set V = {1, 2, 3, 4}, such that each number appears exactly once in the same grid, exactly once in any row, and exactly once in any column. Below is a diagram depicting an empty 2x2 Sudoku and a possible solution state.



Write a program that takes an empty 2x2 grid as input and fills it to reach a valid solution state using backtracking.

********** **Good Luck** **********