

Algorithms and Problem-Solving Lab (15B17CI471)
EVEN 2022
Week - 7 (21st – 26th Mar 2022)
Practice Assignment

1. Given a 2D board of characters and a word to search, find if the word exists in the grid. The word can be constructed from letters of sequentially adjacent cells, where adjacent cells are those horizontally or vertically neighboring. The same letter cell may not be used more than once. Given below are the sample inputs and their outputs respectively for the problem

For example: Given

```
board = [ ["ABCE"],  
          ["SFCS"],  
          ["ADEE"]  
        ]
```

word = "ABCCED", -> returns true.

2. Given a maze in the form of a binary rectangular matrix, find the shortest path's length in the maze from a given source to a given destination. The path can only be constructed out of cells having value 1, and at any moment, we can only move one step in one of the four directions.

The valid moves are:

Go Top: $(x, y) \rightarrow (x - 1, y)$

Go Left: $(x, y) \rightarrow (x, y - 1)$

Go Down: $(x, y) \rightarrow (x + 1, y)$

Go Right: $(x, y) \rightarrow (x, y + 1)$

For example, consider the following binary matrix. If source = (0, 0) and destination = (7, 5), the shortest path from source to destination has length 12.

```
[ 1  1  1  1  1  0  0  1  1  1 ]  
[ 0  1  1  1  1  1  0  1  0  1 ]  
[ 0  0  1  0  1  1  1  0  0  1 ]  
[ 1  0  1  1  1  0  1  1  0  1 ]  
[ 0  0  0  1  0  0  0  1  0  1 ]  
[ 1  0  1  1  1  0  0  1  1  0 ]  
[ 0  0  0  0  1  0  0  1  0  1 ]  
[ 0  1  1  1  1  1  1  1  0  0 ]  
[ 1  1  1  1  1  0  0  1  1  1 ]  
[ 0  0  1  0  0  1  1  0  0  1 ]
```

3. Given an array `nums` of distinct integers, return *all the possible permutations*. You can return the answer in **any order**.

Example :

Input: `nums = [1,2,3]`

Output: `[[1,2,3],[1,3,2],[2,1,3],[2,3,1],[3,1,2],[3,2,1]]`

4. The **n-queens** puzzle is the problem of placing `n` queens on an `n x n` chessboard such that no two queens attack each other. Given an integer `n`, return *all distinct solutions to the n-queens puzzle*. You may return the answer in **any order**. Each solution contains a distinct board configuration of the n-queens' placement, where `'Q'` and `'.'` both indicate a queen and an empty space, respectively.

Input: `n = 4`

Output: `[[".Q..","...Q","Q...","..Q."],["..Q.", "Q...", "...Q", ".Q.."]]`

Explanation: There exist two distinct solutions to the 4-queens puzzle

5. Given a balanced parentheses string `s`, return *the score of the string*.

The **score** of a balanced parentheses string is based on the following rule:

- `"()"` has score `1`.
- `AB` has score `A + B`, where `A` and `B` are balanced parentheses strings.
- `(A)` has score `2 * A`, where `A` is a balanced parentheses string.

Example 1:

Input: `s = "()"`

Output: `1`

Example 2:

Input: `s = "(())"`

Output: `2`

Example 3:

Input: `s = "(()())"`

Output: `2`

