Validate Sudoku Board LeetCode

Determine if a 9 x 9 Sudoku board is valid. Only the filled cells need to be validated **according to the following rules**:

1. Each row must contain the digits 1-9 without repetition.
2. Each column must contain the digits 1-9 without repetition.
3. Each of the nine 3 x 3 sub-boxes of the grid must contain the digits 1-9 without repetition.

Note:

- A Sudoku board (partially filled) could be valid but is not necessarily solvable.
- Only the filled cells need to be validated according to the mentioned rules.

Example 1:

Input: board =

[["5","3",".",".","7",".",".",".",".",]

,["6",".",".","1","9","5",".",".",".",]

,[".","9","8",".",".",".",".",".","6",".",]

,["8",".",".",".","6",".",".",".","3"]

,["4",".",".","8",".","3",".",".","1"]

,["7",".",".",".","2",".",".",".","6"]

,[".","6",".",".",".",".",".","2","8",".",]

,[".",".",".","4","1","9",".",".","5"]

,[".",".",".",".","8",".",".","7","9"]]

Output: true

Example 2:

Input: board =

[["8","3",".",".","7",".",".",".","."]

,["6",".",".","1","9","5",".",".","."]

,[".","9","8",".",".",".",".","6","."]

,["8",".",".",".","6",".",".",".","3"]

,["4",".",".","8",".","3",".",".","1"]

,["7",".",".",".","2",".",".",".","6"]

,[".","6",".",".",".",".","2","8","."]

,[".",".",".","4","1","9",".",".","5"]

,[".",".",".",".","8",".",".","7","9"]]

Output: false

Approach 1: Function to check if a Sudoku board is valid

Function Purpose:

Check if a given Sudoku board is valid.

Explanation:

- **isPossible Function:**
    - Checks if placing a value at a specific position is valid in the Sudoku grid.
    - Validates the value in the current row, column, and the 3x3 subgrid.
- **isValidSudokuHelper Function:**
    - Iterates through each cell in the board.
    - Temporarily removes each non-empty cell value for validation.
    - Calls **isPossible** to check the validity of each placement.
    - Restores the removed value after validation.
    - Returns true if all placements are valid.
- **isValidSudoku Function:**
    - Initializes the validation process by calling **isValidSudokuHelper**.

- Returns true if the board is valid.

Time Complexity:

- **The time complexity is O(1) because the size of the Sudoku board is fixed.**

Space Complexity:

- **The space complexity is O(1) as no additional space is used that scales with the input size.**