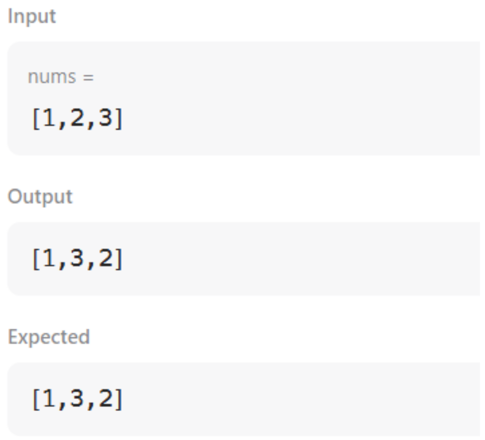
Date: 19/11/2024

DSA Practice Problems

1. **Next Permutation**

```
class Solution {
    public void nextPermutation(int[] nums) {
        int index1=-1;
        int index2=-1;
        for(int i=nums.length-2;i>=0;i--){
            if(nums[i]<nums[i+1]){
                index1=i;
                break;
            }
        }
        if(index1==-1){
            reverse(nums,0);
        }
        else{
            for(int i=nums.length-1;i>=0;i--){
                if(nums[i]>nums[index1]){
                    index2=i;
                    break;
                }
            }
            swap(nums,index1,index2);
            reverse(nums,index1+1);
        }
    }
    void swap(int[] nums,int i,int j){
        int temp=nums[i];
        nums[i]=nums[j];
```

```
            nums[j]=temp;
        }
        void reverse(int[] nums,int start){
            int i=start;
            int j=nums.length-1;
            while(i<j){
                swap(nums,i,j);
                i++;
                j--;
            }
        }
    }
```



Input

nums =

[1,2,3]

Output

[1,3,2]

Expected

[1,3,2]

Time Complexity: O(n)

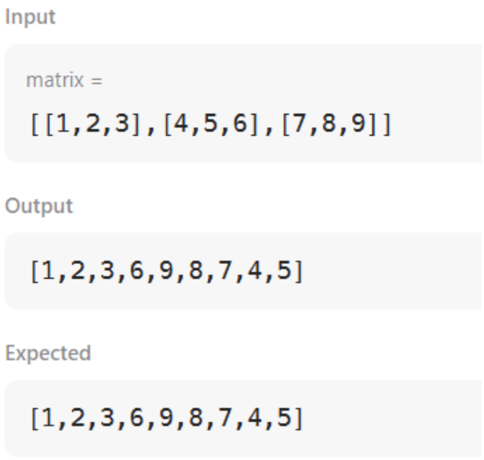
2. Spiral Matrix

```
class Solution {
    public List<Integer> spiralOrder(int[][] matrix) {
        List<Integer> result = new ArrayList<>();
        if (matrix == null || matrix.length == 0) {
            return result;
        }
        int m = matrix.length;
        int n = matrix[0].length;
        int top = 0, bottom = m - 1, left = 0, right = n - 1;
        while (top <= bottom && left <= right) {
            for (int i = left; i <= right; ++i) {
                result.add(matrix[top][i]);
            }
            top++;


            for (int i = top; i <= bottom; ++i) {
                result.add(matrix[i][right]);
            }
            right--;


            if (top <= bottom) {
                for (int i = right; i >= left; --i) {
                    result.add(matrix[bottom][i]);
                }
                bottom--;
            }
            if (left <= right) {
                for (int i = bottom; i >= top; --i) {
                    result.add(matrix[i][left]);
                }
                left++;
            }
        }

        return result;
    }
}
```



Input

matrix =

```
[[1,2,3],[4,5,6],[7,8,9]]
```

Output

```
[1,2,3,6,9,8,7,4,5]
```

Expected

```
[1,2,3,6,9,8,7,4,5]
```

Time Complexity: O(m*n)

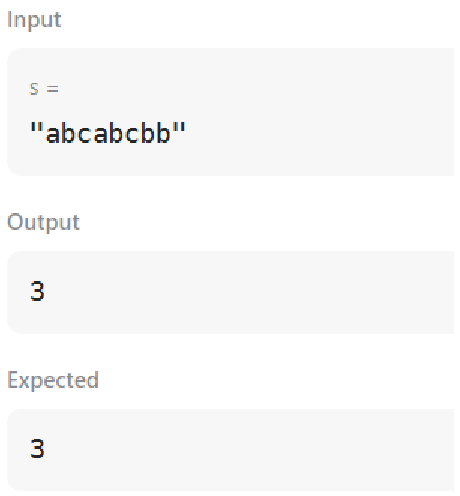
3. Longest substring without repeating characters

```
class Solution {
    public int lengthOfLongestSubstring(String s) {
        if (s == null || s.length() == 0) return 0;

        HashMap<Character, Integer> charIndexMap = new HashMap<>();
        int maxLength = 0;
        int start = 0;

        for (int end = 0; end < s.length(); end++) {
            char currentChar = s.charAt(end);
            if (charIndexMap.containsKey(currentChar) &&
charIndexMap.get(currentChar) >= start) {
                start = charIndexMap.get(currentChar) + 1;
            }
            charIndexMap.put(currentChar, end);
            maxLength = Math.max(maxLength, end - start + 1);
        }

        return maxLength;
    }
}
```



Input

s =

"abcabcbb"

Output

3

Expected

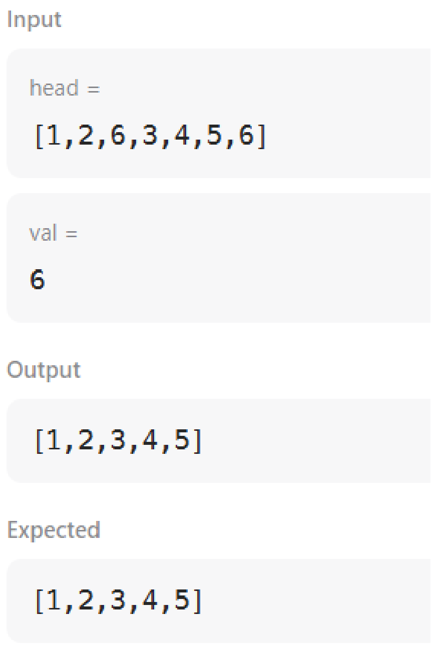
3

Time Complexity: O(n)

4. Remove linked list elements

```
class Solution {
    public ListNode removeElements(ListNode head, int val) {
        ListNode sol=new ListNode(0,head);
        ListNode pointer=sol;
        while(pointer!=null){
            while(pointer.next!=null && pointer.next.val==val){
                pointer.next=pointer.next.next;
            }
            pointer=pointer.next;
        }
        return sol.next;

    }
}
```



Input

head =

```
[1,2,6,3,4,5,6]
```

val =

```
6
```

Output

```
[1,2,3,4,5]
```

Expected

```
[1,2,3,4,5]
```

Time Complexity: O(n)

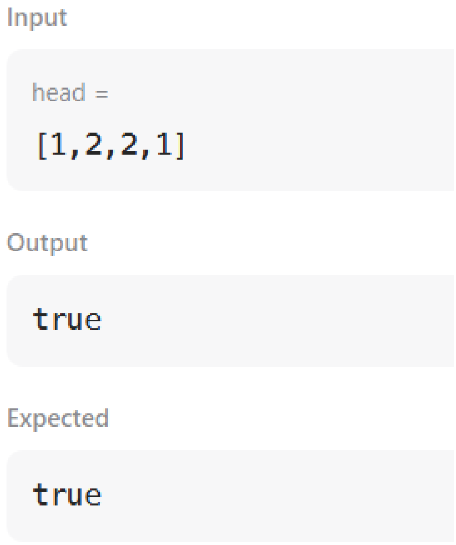
5. Palindrome linked list

```
private ListNode reverseList(ListNode head) {

        ListNode prev = null;

        while (head != null) {

            ListNode next = head.next;
            head.next = prev;
            prev = head;
            head = next;
        }
        return prev;
    }
```



Input

head =

```
[1,2,2,1]
```

Output

```
true
```

Expected

```
true
```

Time Complexity: O(n)

6. **Minimum path sum**

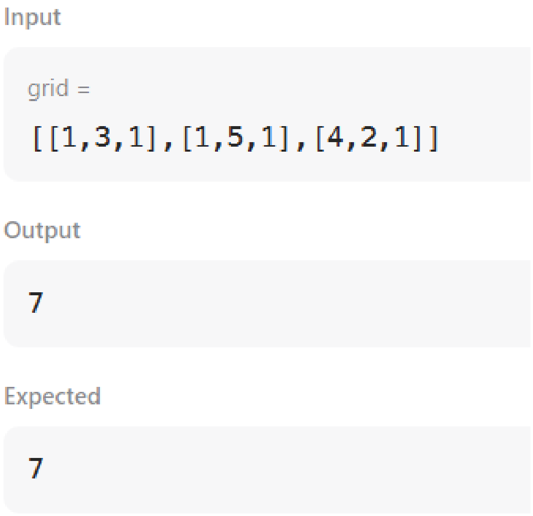
```
class Solution {
    public int minPathSum(int[][] grid) {
        int m = grid.length;
        int n = grid[0].length;
        int[][] dp = new int[m][n];
        dp[0][0] = grid[0][0];

        for (int j = 1; j < n; j++) {
            dp[0][j] = dp[0][j - 1] + grid[0][j];
        }

        for (int i = 1; i < m; i++) {
            dp[i][0] = dp[i - 1][0] + grid[i][0];
        }

        for (int i = 1; i < m; i++) {
            for (int j = 1; j < n; j++) {
                dp[i][j] = grid[i][j] + Math.min(dp[i - 1][j], dp[i][j - 1]);
            }
        }

        return dp[m - 1][n - 1];
    }
}
```



Input

grid =

```
[[1,3,1],[1,5,1],[4,2,1]]
```

Output

```
7
```

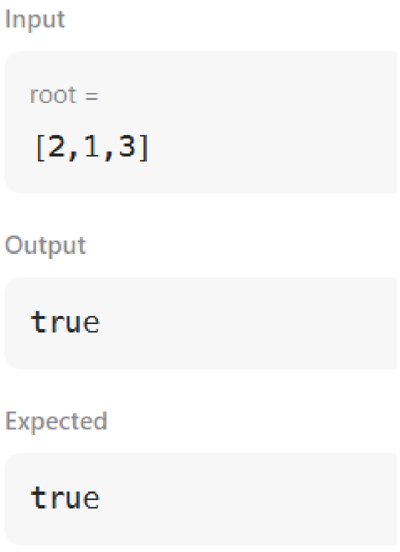
Expected

```
7
```

Time Complexity: O(m*n)

7. **Validate binary search tree**

```
class Solution {
    public boolean isValidBST(TreeNode root) {
        if (root == null){
            return true;
        }
        Stack<TreeNode> stack1 = new Stack<>();
        TreeNode prev = null;
        while (root != null || !stack1.isEmpty()) {
            while (root != null) {
                stack1.push(root);
                root = root.left;
            }
            root = stack1.pop();
            if(prev != null && root.val <= prev.val){
                return false;
            }
            prev = root;
            root = root.right;
        }
        return true;
    }
}
```



Input

root =

```
[2,1,3]
```

Output

```
true
```

Expected

```
true
```

Time Complexity: O(m*n)