PRACTICE SET – 3

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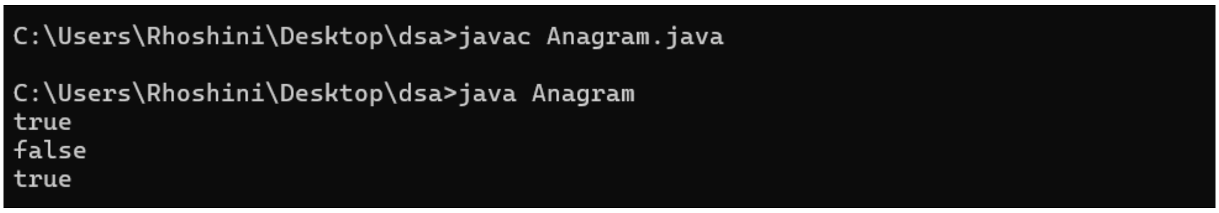
1. Anagram

```
class Anagram {
    public static void main(String[] args) {
        String s1 = "geeks", s2 = "kseeg";
        System.out.println(isAnagram(s1, s2));
        String s3 = "allergy", s4 = "allergic";
        System.out.println(isAnagram(s3, s4));
        String s5 = "g", s6 = "g";
        System.out.println(isAnagram(s5, s6));
    }
    static boolean isAnagram(String s1, String s2) {
        if (s1.length() != s2.length()) return false;
        int[] count = new int[26];
        for (char c : s1.toCharArray()) count[c - 'a']++;
        for (char c : s2.toCharArray()) {
            if (--count[c - 'a'] < 0) return false;
        }
        return true;
    }
}
```

OUTPUT:



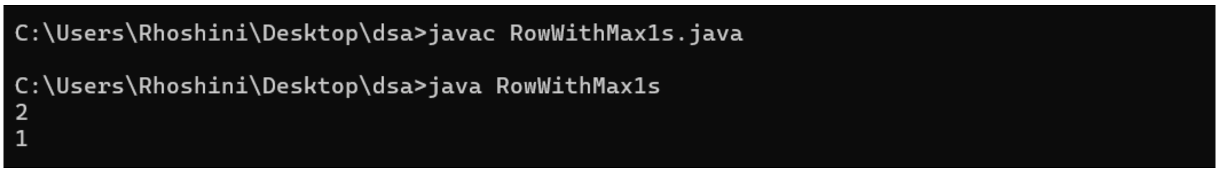
```
C:\Users\Rhoshini\Desktop\dsa>javac Anagram.java

C:\Users\Rhoshini\Desktop\dsa>java Anagram
true
false
true
```

Time Complexity: O(n)
Space Complexity: O(1)

2. Row with max 1s

```
class RowWithMax1s {
    public static void main(String[] args) {
        int[][] arr1 = {{0, 1, 1, 1}, {0, 0, 1, 1}, {1, 1, 1, 1}, {0, 0, 0, 0}};
        System.out.println(rowWithMax1s(arr1, 4, 4));
        int[][] arr2 = {{0, 0}, {1, 1}};
        System.out.println(rowWithMax1s(arr2, 2, 2));
    }
    static int rowWithMax1s(int[][] arr, int n, int m) {
        int maxRow = -1, j = m - 1;
        for (int i = 0; i < n; i++) {
            while (j >= 0 && arr[i][j] == 1) {
                j--;
                maxRow = i;
            }
        }
        return maxRow;
    }
}
```

OUTPUT:



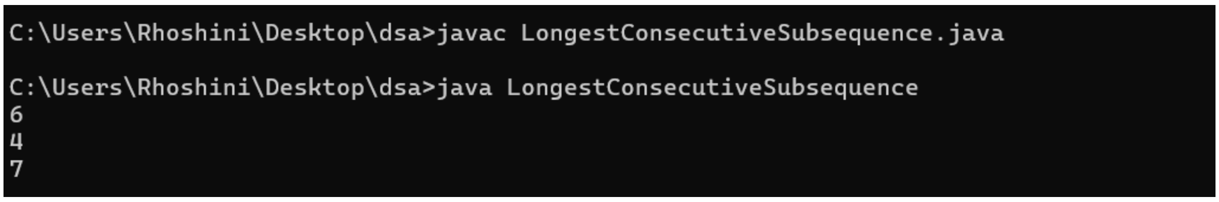
```
C:\Users\Rhoshini\Desktop\dsa>javac RowWithMax1s.java

C:\Users\Rhoshini\Desktop\dsa>java RowWithMax1s
2
1
```

Time Complexity: O(n + m)
Space Complexity: O(1)

3. Longest Consecutive Subsequence

```
import java.util.HashSet;
class LongestConsecutiveSubsequence {
    public static void main(String[] args) {
        int[] arr1 = {2, 6, 1, 9, 4, 5, 3};
        System.out.println(longestConseqSubseq(arr1, arr1.length));
        int[] arr2 = {1, 9, 3, 10, 4, 20, 2};
        System.out.println(longestConseqSubseq(arr2, arr2.length));
        int[] arr3 = {15, 13, 12, 14, 11, 10, 9};
        System.out.println(longestConseqSubseq(arr3, arr3.length));
    }
    static int longestConseqSubseq(int[] arr, int n) {
        HashSet<Integer> set = new HashSet<>();
        for (int num : arr) set.add(num);
        int maxLen = 0;
        for (int num : arr) {
            if (!set.contains(num - 1)) {
                int currNum = num;
                int currLen = 1;
                while (set.contains(currNum + 1)) {
                    currNum++;
                    currLen++;
                }
                maxLen = Math.max(maxLen, currLen);
            }
        }
        return maxLen;
    }
}
```

OUTPUT:



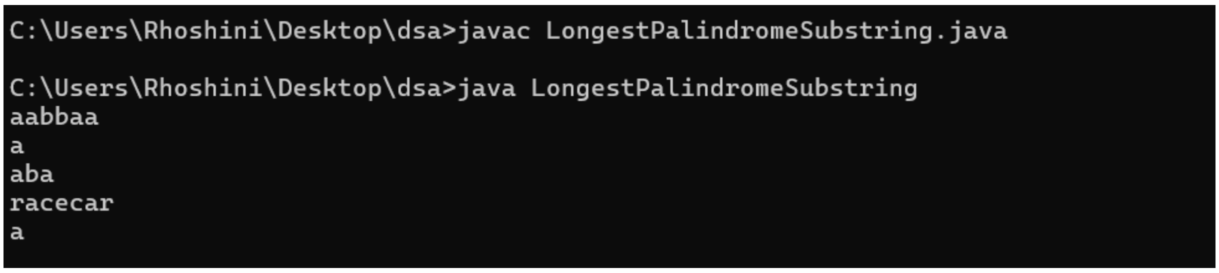
```
C:\Users\Rhoshini\Desktop\dsa>javac LongestConsecutiveSubsequence.java

C:\Users\Rhoshini\Desktop\dsa>java LongestConsecutiveSubsequence
6
4
7
```

Time Complexity: O(n)
Space Complexity: O(n)

4. Longest Palindrome Substring

```
import java.util.*;
class LongestPalindromeSubstring {
    public static String longestPalindrome(String s) {
        if (s.length() == 0) return "";
        int start = 0, maxLength = 1;
        for (int i = 0; i < s.length(); i++) {
            int len1 = expandAroundCenter(s, i, i);
            int len2 = expandAroundCenter(s, i, i + 1);
            int len = Math.max(len1, len2);
            if (len > maxLength) {
                maxLength = len;
                start = i - (len - 1) / 2;
            }
        }
        return s.substring(start, start + maxLength);
    }
    private static int expandAroundCenter(String s, int left, int right) {
        while (left >= 0 && right < s.length() && s.charAt(left) == s.charAt(right)) {
            left--;
            right++;
        }
        return right - left - 1;
    }

    public static void main(String[] args) {
        String s1 = "aaaabbaa";
        String s2 = "abc";
        String s3 = "abacdfgdcaba";
        String s4 = "racecar";
        String s5 = "a";
        System.out.println(longestPalindrome(s1));
        System.out.println(longestPalindrome(s2));
        System.out.println(longestPalindrome(s3));
        System.out.println(longestPalindrome(s4));
        System.out.println(longestPalindrome(s5));
    }
}
```

OUTPUT:



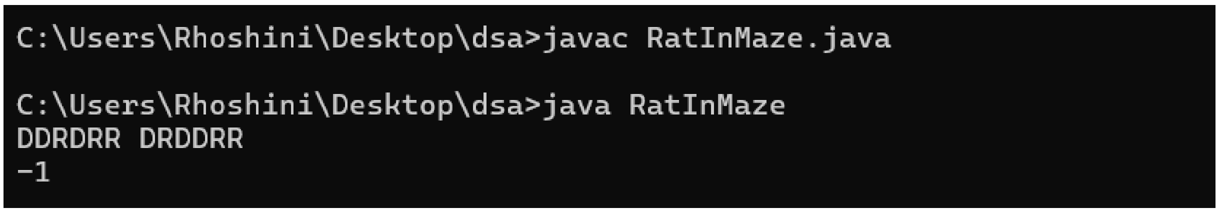
```
C:\Users\Rhoshini\Desktop\dsa>javac LongestPalindromeSubstring.java

C:\Users\Rhoshini\Desktop\dsa>java LongestPalindromeSubstring
aabbaa
a
aba
racecar
a
```

Time Complexity: O(n^2)
Space Complexity: O(1)

5. Rat in a Maze Problem - I

```
import java.util.*;
class RatInMaze {
    public static boolean isSafe(int[][] mat, boolean[][] visited, int x, int y, int N) {
        return (x >= 0 && x < N && y >= 0 && y < N && mat[x][y] == 1 && !visited[x][y]);
    }
    public static void findPaths(int[][] mat, int x, int y, boolean[][] visited, String path, List<String>
paths, int N) {
        if (x == N - 1 && y == N - 1) {
            paths.add(path);
            return;
        }
        visited[x][y] = true;
        if (isSafe(mat, visited, x + 1, y, N)) {
            findPaths(mat, x + 1, y, visited, path + "D", paths, N);
        }
        if (isSafe(mat, visited, x - 1, y, N)) {
            findPaths(mat, x - 1, y, visited, path + "U", paths, N);
        }
        if (isSafe(mat, visited, x, y + 1, N)) {
            findPaths(mat, x, y + 1, visited, path + "R", paths, N);
        }
        if (isSafe(mat, visited, x, y - 1, N)) {
            findPaths(mat, x, y - 1, visited, path + "L", paths, N);
        }
        visited[x][y] = false;
    }
    public static List<String> getAllPaths(int[][] mat) {
        int N = mat.length;  // Dynamically set N based on the matrix size
        List<String> paths = new ArrayList<>();
        boolean[][] visited = new boolean[N][N];
        if (mat[0][0] == 1) {
            findPaths(mat, 0, 0, visited, "", paths, N);
        }
        Collections.sort(paths);
        return paths.isEmpty() ? Arrays.asList("-1") : paths;
    }
    public static void main(String[] args) {
        int[][] mat1 = {{1, 0, 0, 0}, {1, 1, 0, 1}, {1, 1, 0, 0}, {0, 1, 1, 1}};
        int[][] mat2 = {{1, 0}, {1, 0}};
        System.out.println(String.join(" ", getAllPaths(mat1)));
        System.out.println(String.join(" ", getAllPaths(mat2)));
    }
}
```

OUTPUT:



```
C:\Users\Rhoshini\Desktop\dsa>javac RatInMaze.java

C:\Users\Rhoshini\Desktop\dsa>java RatInMaze
DDRDRR DRDDRR
-1
```

Time Complexity: O(3^n^2)
Space Complexity: O(l * x)