EC 4060 – Data Structures and Algorithms

LAB 09

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2021/E/075

GROUP CG8

EC4070

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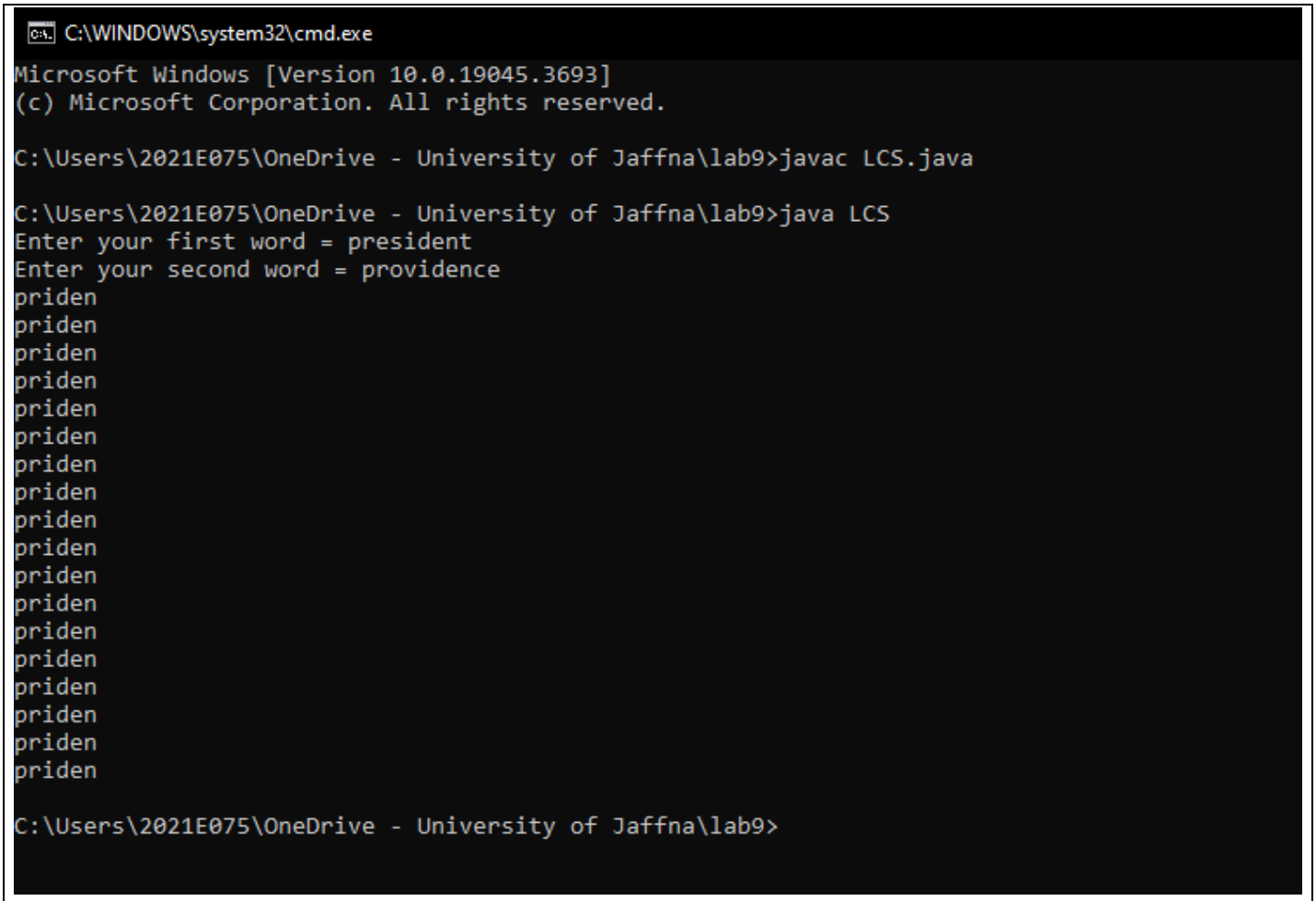
Q1.

```java
import java.util.ArrayList;
import java.util.List;
import java.util.Scanner;

public class LCS{
    public static void main(String[] args) {
Scanner scanner = new Scanner(System.in);
String a;

        System.out.print("Enter your first word = ");
        String A = scanner.nextLine().trim();
        System.out.print("Enter your second word = ");
        String B = scanner.nextLine().trim();

        List<String> lcsResults = findLCS(A, B);
        for (String result : lcsResults) {
            System.out.println(result);

        }
    }

    private static List<String> findLCS(String str1, String str2) {
        int m = str1.length();
        int n = str2.length();

        int[][] dp = new int[m + 1][n + 1];

        for (int i = 1; i <= m; i++) {
            for (int j = 1; j <= n; j++) {
                if (str1.charAt(i - 1) == str2.charAt(j - 1)) {
                    dp[i][j] = dp[i - 1][j - 1] + 1;
                } else {
                    dp[i][j] = Math.max(dp[i - 1][j], dp[i][j - 1]);
                }
            }
        }

        List<String> lcsResults = new ArrayList<>();
        backtrack(dp, str1, str2, m, n, "", lcsResults);

        return lcsResults;
    }

    private static void backtrack(int[][] dp, String str1, String str2, int i, int j, String current, List<String> results) {
        if (i == 0 || j == 0) {
            results.add(new StringBuilder(current).reverse().toString());
            return;
        }

        if (str1.charAt(i - 1) == str2.charAt(j - 1)) {
            backtrack(dp, str1, str2, i - 1, j - 1, current + str1.charAt(i - 1), results);
        } else {
            if (dp[i - 1][j] >= dp[i][j - 1]) {
                backtrack(dp, str1, str2, i - 1, j, current, results);
            }
            if (dp[i][j - 1] >= dp[i - 1][j]) {
                backtrack(dp, str1, str2, i, j - 1, current, results);
```

```java
    private static void backtrack(int[][] dp, String str1, String str2, int i, int j, String current, List<String> results) {
        if (i == 0 || j == 0) {
            results.add(new StringBuilder(current).reverse().toString());
            return;
        }

        if (str1.charAt(i - 1) == str2.charAt(j - 1)) {
            backtrack(dp, str1, str2, i - 1, j - 1, current + str1.charAt(i - 1), results);
        } else {
            if (dp[i - 1][j] >= dp[i][j - 1]) {
                backtrack(dp, str1, str2, i - 1, j, current, results);
            }
            if (dp[i][j - 1] >= dp[i - 1][j]) {
                backtrack(dp, str1, str2, i, j - 1, current, results);
            }
        }
    }
}
```


C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.19045.3693]
(c) Microsoft Corporation. All rights reserved.
C:\Users\2021E075\OneDrive - University of Jaffna\lab9>javac LCS.java
C:\Users\2021E075\OneDrive - University of Jaffna\lab9>java LCS
Enter your first word = president
Enter your second word = providence
priden
priden
priden
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priden
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