**ntroduction**

ID Forgery has been a prevalent issue in the city of Einstakt, especially in bars. You are currently working in a government agency that tries to identify individuals sharing the same ID numbers and perform a formal investigation. Each day, your team travels to two random bars to collect the encoded IDs of each bar patron.

Those with the same ID numbers will be approached and invited for an interrogation. At the end of each mission, a report with listings of guilty and innocent individuals will be sent to the senior team members for further processing.

Your task is to write a program to decode the ID numbers, find the decoded ID duplicates (if there are any), and generate a report with decoded IDs of all the guilty and innocent individuals.

***Assumptions:***

● Each input file may contain a maximum of 100 encoded IDs.

● Bar names will always be “Bar1” and “Bar2”.

● Each encoded and decoded ID may vary in length (8293, 00087, 49, …).

● Each encoded ID contains only numbers and parentheses.

● Each encoded ID has *m* characters, where 1 <= *m* <= 100

● Two different encoded IDs that map to the same decoded ID number are

considered duplicates. There will only be at most two people who share the

same decoded IDs.

● All ID encodings will always have balanced parentheses.

● There will be no space in each encoded ID.

**Rules and Operations**

1. To decode each ID, reverse the numbers in each pair of the matching parentheses, starting from the innermost pair.
2. Find the ID duplicates in both bar locations.
3. In your report, print the decoded IDs of both guilty and innocent individuals in ascending order. The output format is shown in the examples below.

**Note: You must use stacks and linked lists to implement your solution. All linked list operations must be implemented using recursion!!! Points will be deducted for using iterative implementations.**

**Example 1:**

***Input11.txt***

Bar1

10(01)

(4321)

Bar2

(20)02

Bar1

(20)21

Bar2

3(021)

(4321)

***Output11.txt***

Guilty:

1234 // All ID(s) sorted in ascending order

Innocent:

0202

0221 // All ID(s) sorted in ascending order

1010

3120

***Command line:***

./decode “input=input11.txt;output=output11.txt” **or** ./decode input=input11.txt output=output11.txt