

6 Rory's Redundancy Removal

(CPU:1sec - RAM:256MB)

Rory is an aspiring writer. He has spent most of the last couple of years writing his first novel, entitled *Dreams and Shrugs*. Before submitting it to a publisher, he handed you a copy of the draft and asked for your opinion. It took you quite some time before being able to give him some feedback, as the novel is thousands of pages long. Despite the length of the work, you were admiring of the compelling story, deep characters and original setting that Rory had managed to put together.

While you are blown away by the quality of Rory's writing, and would not be surprised if his book became a best-seller, you are equally worried on the impact that such an expansive work would have on the environment. A popular book means many copies sold, and therefore many trees chopped to provide for all the necessary paper. You look for superfluous material to crop from the final edition, but Rory is an expert story-teller and every seemingly insignificant plot detail in his novel becomes relevant later on.

What Rory uses liberally is punctuation, specifically parentheses. There is an opportunity to considerably shorten the length of his book by removing the many redundant pairs of parentheses he used. A pair P of parentheses is considered redundant if:

- the character c_1 immediately following the opening parenthesis of P is also an opening parenthesis.
- the character c_2 immediately preceding the closing parenthesis of P is also a closing parenthesis.
- the opening parenthesis c_1 and the closing parenthesis c_2 belong to the same pair P' of parentheses.

So for example, in “((some words))” the underlined parentheses form a redundant pair, but in “(some (words))” they do not (because the opening parentheses are not immediately succeeding each other) and in “((some)(words))” they do not either (because the neighboring parentheses do not belong to the same pair). To save the trees, you have to write a program that takes into input a text possibly containing redundant pairs of parentheses and output the same texts without these redundant pairs.

Input The input shall consist of two lines, the first consisting of a single integer N with $1 \leq N \leq 500000$, and the second consisting of N characters (including spaces). The characters in the second line of the input can only be a letter (possibly upper case), a space, or one of the following punctuation signs: () , . : ; ? !

You can assume that the parenthesing in the input is valid, that is the number of closing parentheses is exactly equal to the number of opening parentheses, and at any point in the input the number of opening parentheses read so far is equal or greater to the number of closing parentheses read so far.

Output The output shall consist of a single line, equivalent to the second line of the input minus redundant pairs of parentheses.

Sample Input 1

40
Irel((and i))s ((an) (island)) in the...

Sample Output 1

Irel(and i)s ((an) (island)) in the...

Sample Input 2

54
Cork(, is a ((ci(ty): i))n) south(-((west)))Ireland

Sample Output 2

Cork(, is a (ci(ty): i)n) south(-((west)))Ireland