

Problem B: Broken Parentheses

- Time Limit: 2 sec

Problem Statement

Let us define a **correct parenthesis sequence** as a string that satisfies any of the following conditions:

- It is an empty string.
- It is formed by concatenating $(, A,)$ in this order where A is a **correct parenthesis sequence**.
- It is formed by concatenating A and B in this order where A and B are non-empty **correct parenthesis sequences**.

Given a string S of length N consisting of the characters $($ and $)$.

For each i where $0 \leq i \leq N$, define the string T_i as the string obtained by concatenating the suffix of S of length $N - i$ and the reversed string of the prefix of S of length i , in this order. That is, if we denote the i -th character of S as S_i , the string T_i is formed by arranging the characters $S_{i+1}, S_{i+2}, \dots, S_N, S_i, \dots, S_2, S_1$ in sequence.

For each T_i where $0 \leq i \leq N$, solve the following problem:

- Consider an operation where you replace one character in T_i with either $($ or $)$. Find the minimum number of such operations required to make T_i a **correct parenthesis sequence**.

Input

The input is given in the following format:

N
 S

- $2 \leq N \leq 200,000$
- N is even.
- S is a string of length N consisting only of $($ and $)$.

Output

Output $N + 1$ lines. On the $i + 1$ -th line, output the answer for T_i .

Sample Input 1	Sample Output 1
4 () ()	0 2 2 2 2
Sample Input 2	Sample Output 2
6))) (((4 2 2 0 0 0 0

Sample Input 3

```
8
)())()(
```

Sample Output 3

```
3
1
3
1
1
1
1
1
1
1
```