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C. Even Positions

time limit per test: 2 seconds

memory limit per test: 256 megabytes

Monocarp had a regular bracket sequence s of length n (n is even). He even came up with his own way to calculate its cost.

He knows that in a regular bracket sequence (RBS), each opening bracket is paired up with the corresponding closing bracket. So he decided to calculate the *cost* of RBS as the sum of distances between pairs of corresponding bracket pairs.

For example, let's look at RBS $(())()$. It has three pairs of brackets:

- $(______)$: the distance between brackets at position 1 and at 4 is $4 - 1 = 3$;
- $___()$: the distance is $3 - 2 = 1$;
- $______()$: the distance is $6 - 5 = 1$.

So the cost of $(())()$ is $3 + 1 + 1 = 5$.

Unfortunately, due to data corruption, Monocarp lost all characters on odd positions s_1, s_3, \dots, s_{n-1} . Only characters on even positions (s_2, s_4, \dots, s_n) remain. For example, $(())()$ turned to $__()__$.

Monocarp wants to restore his RBS by placing brackets on the odd positions. But since the restored RBS may not be unique, he wants to choose one with **minimum cost**. It's too hard to do for Monocarp alone, so can you help him?

Reminder: A *regular bracket sequence* is a string consisting of only brackets, such that this sequence, when inserted 1-s and +-s, gives a valid mathematical expression. For example, $()$, $((______))$ or $((______))(______)$ are RBS, while $)$, $(______)$ or $((______))(______)$ are not.

Input

The first line contains a single integer t ($1 \leq t \leq 5000$) — the number of test cases. Next t cases follow.

The first line of each test case contains a single integer n ($2 \leq n \leq 2 \cdot 10^5$; n is even) — the length of string s .

The second line of each test case contains a string s of length n , where all characters on the odd positions are $__$ and all characters on the even positions are either $($ or $)$.

Additional constraints:

- s can be restored to at least one regular bracket sequence;
- the total sum of n over all test cases doesn't exceed $2 \cdot 10^5$.

Output

For each test case, print one integer — the minimum cost of the regular bracket sequence that can be obtained from s by replacing $__$ -s with brackets.

Example

4

Educational Codeforces Round 168 (Rated for Div. 2)

Finished

Practice



→ Virtual participation

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 Language:

 Choose file: No file chosen

→ Problem tags

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→ Contest materials

- Announcement 
- Tutorial #1 
- Video Tutorial (en) 

6	
2	<code>_() _)</code>
8	<code>_()</code>
8	<code>_() _) _)</code>
8	<code>_() _ ()</code>
output	
5	
1	
4	
8	

[Copy](#)**Note**

In the first test case, it's optimal to make s equal to `(()) ()`. The cost of s will be equal to $3 + 1 + 1 = 5$.

In the second test case, the only option is to make s equal to `()` with cost 1.

In the third test case, the only possible RBS is `() () () ()` with cost $1 + 1 + 1 + 1 = 4$.

In the fourth test case, it's optimal to make s equal to `(()) (())` with cost $3 + 1 + 3 + 1 = 8$.

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