

Contest Duration: 2025-10-04(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251004T2100&p1=248>) - 2025-10-04(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251004T2240&p1=248>) (local time) (100 minutes)

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## D - Pop and Insert

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 400 points

### Problem Statement

You are given a string  $S$  of length  $N$  consisting of  $0$  and  $1$ .

You can perform the following operation on  $S$  any number of times (possibly zero):

- Delete the first or last character, flip it (change  $0$  to  $1$  or  $1$  to  $0$ ), and insert it back at any position. More formally, let  $r(0) = 1$  and  $r(1) = 0$ , and perform one of the following:  
(Here,  $S_i$  denotes the  $i$ -th character of  $S$ .)
  - Choose any  $i$  ( $1 \leq i \leq N$ ) and change  $S$  to  $S_2 \dots S_i r(S_1) S_{i+1} \dots S_N$ .
  - Choose any  $i$  ( $0 \leq i \leq N - 1$ ) and change  $S$  to  $S_1 \dots S_i r(S_N) S_{i+1} \dots S_{N-1}$ .

Find the minimum number of operations required to make all characters of  $S$  the same. It can be proved that such a sequence of operations always exists.

You are given  $T$  test cases, so solve each of them.

### Constraints

- $1 \leq T \leq 2 \times 10^5$
- $2 \leq N \leq 5 \times 10^5$
- $T$  and  $N$  are integers.
- $S$  is a string of length  $N$  consisting of  $0$  and  $1$ .

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- The sum of  $N$  over all test cases is at most  $5 \times 10^5$ .

## Input

The input is given from Standard Input in the following format:

```
 $T$   
case1  
case2  
⋮  
case $T$ 
```

case <sub>$i$</sub>  represents the  $i$ -th test case. Each test case is given in the following format:

```
 $N$   
 $S$ 
```

## Output

Output  $T$  lines. The  $i$ -th line ( $1 \leq i \leq T$ ) should contain the answer for the  $i$ -th test case.

### Sample Input 1

[Copy](#)

```
3  
5  
01001  
3  
000  
15  
110010111100101
```

[Copy](#)

### Sample Output 1

[Copy](#)

```
4  
0  
16
```

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For the first test case, for example, you can make all characters of  $S$  into 0 with four operations as follows. It is impossible to make all characters of  $S$  the same with three or fewer operations, so the answer is 4.

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- Delete the first character 0, and insert 1 between the 1st and 2nd characters (in  $S$  after deletion).  $S$  becomes 11001.
- Delete the first character 1, and insert 0 between the 2nd and 3rd characters (in  $S$  after deletion).  $S$  becomes 10001.
- Delete the last character 1, and insert 0 at the end (in  $S$  after deletion).  $S$  becomes 10000.
- Delete the first character 1, and insert 0 at the beginning (in  $S$  after deletion).  $S$  becomes 00000.

For the second test case, all characters of  $S$  are the same from the beginning, so no operation is needed.

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#telegram)

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