

Contest Duration: 2025-05-31(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250531T2100&p1=248>) - 2025-05-31(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250531T2240&p1=248>) (local time) (100 minutes)

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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 any number of times (possibly zero):

- Choose an integer i satisfying $1 \leq i \leq N$, and change S_i from 0 to 1, or from 1 to 0.

Your goal is to make the 1s in S form **at most one** interval. Find the minimum number of operations required to achieve the goal.

More precisely, the goal is to make S such that there exists a pair of integers (l, r) satisfying both of the following conditions. Find the minimum number of operations required to achieve the goal.

- $1 \leq l \leq r \leq N + 1$.
- $S_i = 1$ and $l \leq i < r$ are equivalent for each integer i satisfying $1 \leq i \leq N$.

It can be proved that the goal can always be achieved with a finite number of operations.

T test cases are given, so solve each.

Constraints

- $1 \leq T \leq 20000$
- $1 \leq N \leq 2 \times 10^5$

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- S is a string of length N consisting of 0 and 1.
- For each input file, the sum of N over all test cases is at most 2×10^5 .
- T, N are integers.

Input

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

```
T
case1
case2
⋮
caseT
```

case _{i} represents the i -th test case and 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
10011
10
111111111
7
0000000
```

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Sample Output 1

Copy

```
1
0
0
```

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In the first test case, if we perform the operation to change S_1 to 0, the 1s will form one interval. Also, the initial S does not satisfy the condition. Therefore, the answer is 1.

In the second test case, there are no 0s in S , so no operations need to be performed.

Therefore, the answer is 0.

In the third test case, there are no 1s in S , so no operations need to be performed. Therefore, the answer is 0.

Sample Input 2

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```
5
2
01
10
1000010011
12
111100010011
3
111
8
00010101
```

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Sample Output 2

[Copy](#)

```
0
2
3
0
2
```

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