Problem I
Majority Voters

Time limit: 1 second
Memory limit: 1 GB

Problem Description

There are N voters in a line numbered from 1 to N. They are voting in an election between 2 candidates, Alice and Bob. In order from 1 to N, they will each vote for either Alice or Bob.

The voters' preferences are represented by the string S: $S_i = A$ if the i-th voter was going to vote for Alice, and $S_i = B$ if the i-th voter was going to vote for Bob.

You want to rig the elections in favor of Alice. To do this, you have gained a special power. You can persuade people to change their stance to "majority voter". A majority voter numbered X will vote for the candidate who has already received strictly more votes (from previous voters 1 to $X - 1$). In case both candidates have an equal number of votes, a majority voter will not cast their vote at all.

Alice wins the election if and only if the number of voters for her is strictly greater than the number of voters for Bob.
Let $f(S)$ denote the minimum number of people whom you have to transform to majority voters, for Alice to win the election. If it is impossible for Alice to win no matter what, $f(S) = -1$.

Now, coming to the problem. You are given a binary string S of length N, and Q queries of the form:

- Given L and R, find $f(S[L, R])$ where $S[L, R]$ denotes the substring $S_L S_{L+1} \dots S_R$.

Input Format

- The first line of input will contain a single integer T, denoting the number of test cases.
- Each test case consists of multiple lines of input:
  - The first line of each test case contains 2 integers, N and Q - the length of the string and the number of queries.
  - The second line contains a binary string S of size N.
  - The next Q lines each contain 2 integers L and R - the parameters of each query.

Output Format

For each test case, for each query, output on a new line the value of $f(S[L, R])$.

Constraints

- $1 \leq T \leq 10^4$
- $1 \leq N, Q \leq 2 \cdot 10^5$
- $S_i \in \{A, B\}$
- $|S| = N$

- $1 \leq L \leq R \leq N$
- The sum of N and the sum of Q both do not exceed $2 \cdot 10^5$.

Samples

Sample Input 1

```
2
4 4
AABA
1 4
2 3
3 3
3 4
5 2
BBBBA
1 5
5 5
```

Sample Output 1

```
0
1
-1
1
4
0
```

Sample Explanation

Test Case 1: Here are the explanations for each query.

- **Query 1**: Alice is already winning as she has 3 voters voting for her while Bob has only 1.
- **Query 2**: Alice and Bob are tied with 1 vote each. If you change the Bob voter to a majority voter, Alice ends up winning because the majority voter will also vote for her (since the previous voter had voted for Alice).
- **Query 3**: Best you can do is change the only Bob voter to a majority voter, who will not vote for anyone at all; but that's not sufficient to make Alice win. Hence, the answer is -1.
- **Query 4**: Alice and Bob have one vote each. Changing the one Bob voter to a majority voter will result in Alice's victory, since the majority voter won't vote for anyone while Alice will still have one voter.