The 24th Japanese Olympiad in Informatics (JOI 2024/2025)
Spring Training/Qualifying Trial
March 20–24, 2025 (Komaba, Tokyo)

Contest 3 – Conference

Conference

Chairman K is going to host a series of conferences over N days. Each day, exactly one conference is held, and it takes place in one of the three venues: the main venue A or one of the sub-venues B and C.

The venue information for each conference is given as a string S consisting of 'A', 'B', 'C', and '?'. For the i-th day ($1 \le i \le N$), if the i-th character of S is 'A', the conference is held in venue A. If it is 'B', it is held in venue B. If it is 'C', it is held in venue C. If it is '?', the venue for the i-th day has not been decided yet. However, since the conferences on the first and N-th days are expected to have many participants, it has already been determined that venue A will be used on those days.

Chairman K now needs to assign a venue to each undecided conference, choosing one of A, B, or C for each. Additionally, in order to minimize the burden of moving between venues, he wants to minimize the number of indices j ($1 \le j \le N - 1$) such that the venue for the j-th day differs from the venue for the $(j + 1)$-th day.

There are Q scenarios to consider regarding the assignment of venues. The k-th scenario ($1 \le k \le Q$) and the corresponding question are as follows:

- Chairman K has to assign X_k undecided conferences to venue A, Y_k to venue B, and Z_k to venue C. Determine the minimum possible number of indices j such that the venue for the j-th day differs from the venue for the $(j + 1)$-th day.

Given the information about the venues and scenarios to consider, write a program to answer the questions.

Input

Read the following data from the standard input.

N

S

Q

$X_1\ Y_1\ Z_1$

$X_2\ Y_2\ Z_2$

$\vdots$

$X_Q\ Y_Q\ Z_Q$

Output

Write Q lines to the standard output. In the k-th line ($1 \le k \le Q$), output the minimum number of indices j such that the venue for the j-th day differs from the venue for the $(j + 1)$-th day, under the condition that Chairman K assigns X_k undecided conferences to venue A, Y_k to venue B, and Z_k to venue C.

Constraints

- $2 \le N \le 300\,000$.
- S is a string of length N consisting of 'A', 'B', 'C', and '?'.
- The first and N-th characters of S are 'A'.
- $1 \le Q \le 200\,000$.
- $0 \le X_k$ ($1 \le k \le Q$).
- $0 \le Y_k$ ($1 \le k \le Q$).
- $0 \le Z_k$ ($1 \le k \le Q$).
- $X_k + Y_k + Z_k$ is equal to the number of '?' in S ($1 \le k \le Q$).
- N, Q, X_k, Y_k, Z_k are all integers.

Subtasks

1. (4 points) $N \le 50$ and the number of '?' in S is less than or equal to 13.
2. (7 points) $N \le 500$.

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3. (13 points) $N \leq 5\,000$, $Q \leq 10$.

4. (18 points) $N \leq 5\,000$.

5. (12 points) $Q \leq 10$.

6. (8 points) S does not contain 'C' and $Z_k = 0$ $(1 \leq k \leq Q)$.

7. (13 points) $Z_k = 0$ $(1 \leq k \leq Q)$.

8. (25 points) No additional constraints.

Sample Input and Output

Sample Input 1	Sample Output 1
9	3
A??B??C?A	4
3	4
1 3 1	
4 1 0	
0 0 5	

In the first scenario, Chairman K has to assign 1 of the 5 undecided conferences to venue A, 3 to venue B, and 1 to venue C. For example, one possible assignment results in the venue information string "ABBBBCCAA". In this case, the indices j such that the venue for the j-th day differs from the venue for the $(j + 1)$-th day are 1, 5, 7, which means there are 3 such indices. Since it is impossible to reduce this number to 2 or fewer, the correct output for the first line is 3.

In the second scenario, Chairman K has to assign 4 of the 5 undecided conferences to venue A and 1 to venue B. For example, one possible assignment results in the venue information string "AAABBACAA". In this case, the indices j such that the venue for the j-th day differs from the venue for the $(j + 1)$-th day are 3, 5, 6, 7, which means there are 4 such indices. Since it is impossible to reduce this number to 3 or fewer, the correct output for the second line is 4.

In the third scenario, Chairman K has to assign all 5 undecided conferences to venue C. The indices j such that the venue for the j-th day differs from the venue for the $(j + 1)$-th day are 1, 3, 4, 8, which means there are 4 such indices. Therefore, the correct output for the third line is 4.

This sample input satisfies the constraints of subtasks 1, 2, 3, 4, 5, and 8.

Sample Input 2	Sample Output 2
12	4
A???A?B????A	4
4	2
0 8 0	2
2 6 0	
7 1 0	
3 5 0	

This sample input satisfies the constraints of all the subtasks.

Sample Input 3	Sample Output 3
28	15
ACB??B???BCB??B????B?AAA?BBA	11
26	13
6 1 6	13
4 5 4	15
2 3 8	12
9 2 2	15
11 0 2	15
8 4 1	16
11 0 2	15
2 0 11	13
0 1 12	12
12 1 0	10
10 3 0	9
1 4 8	13
3 7 3	15
2 8 3	15
1 3 9	11
11 1 1	12
7 0 6	9
6 4 3	15
8 4 1	15
0 10 3	11
13 0 0	9
11 1 1	15
0 6 7	17
2 8 3	
9 0 4	
0 0 13	

This sample input satisfies the constraints of subtasks 1, 2, 4, and 8.