K: Platform Nine

Time Limit: 3 seconds

Every year, new Hogwarts students must find their way through a magical barrier to board the Hogwarts Express. Finding the barrier takes some effort, unless a wizard sees someone else pass through it shortly before them.

You are on the wizard IT team, and your job is to choose how long the barrier stays visible after a wizard passes through it. This duration d must be a positive integer. Whenever a wizard passes through the barrier at time t, the barrier is visible at every time s with $t \leq s < t + d$.

Each person reaches the barrier at the moment they arrive. A wizard who arrives while the barrier is visible passes through without searching. Otherwise, the wizard searches for the barrier first, then passes through. Wizards are very efficient at searching and this process takes zero time.

Muggles, who are not wizards, do not pass through the barrier, but for security reasons no Muggle may arrive while the barrier is visible.

You are given a list of n people in order of arrival, along with q independent queries. In each query, only people $l, l + 1, \ldots, r$ come to the station, and you must choose a single value of d to use for all of them. Among all values of d for which no Muggle arrives while the barrier is visible, find the minimum number of wizards who must search, and the largest value of d that achieves this minimum.

Input

The first line of input contains a single integer T $(1 \leq T \leq 100)$, representing the number of test cases.

The descriptions of T test cases follow. Each test case starts with a line containing a single integer n $(1 \leq n \leq 3 \cdot 10^5)$, the number of people.

The next line contains a string of length n consisting of the characters `W` and `M`. The i^{th} character is `W` if the i^{th} person is a wizard and `M` if the i^{th} person is a Muggle.

The next line contains n integers $t_1, t_2, \ldots, t_n$ $(1 \leq t_1 < t_2 < \cdots < t_n \leq 10^{18})$, where t_i is the time at which the i^{th} person arrives.

The next line contains a single integer q $(1 \leq q \leq 3 \cdot 10^5)$, the number of queries.

The next q lines each describe one query. Each line contains two integers l and r $(1 \leq l \leq r \leq n)$, indicating that only people $l, l + 1, \ldots, r$ come to the station.

The sum of n over all test cases will not exceed $3 \cdot 10^5$, and the sum of q over all test cases will not exceed $3 \cdot 10^5$.

Output

For each query, output two integers m and d on a single line, where m is the minimum number of wizards who must search for the barrier, and d is the largest duration that achieves this minimum. If d can be arbitrarily large, output -1 for d.

Sample Input 1	Sample Output 1
2 9 WWMMWWMMW 256 384 448 480 496 504 508 510 511 7 1 3 1 4 1 5 1 6 1 7 1 8 1 9 2 MW 6 7 2 1 1 2 2	2 64 2 64 3 64 3 64 4 4 4 4 5 4 0 -1 1 -1