Problem E. House Deconstruction

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	2048 megabytes

In the land of Circleland, there is a circle that has equally spaced points around its circumference. The distance between any two adjacent points is 1.

There are people and houses on the circle's points. Each point contains a person, an empty house, or nothing at all. Each person would like to walk to a different house. Each house can contain at most one person. People can only walk along the circumference of the circle; they cannot cut across.

Currently, there are more houses than people, so you'd like to destroy some of the houses such that the number of remaining houses is equal to the number of people. Suppose you destroy a set of houses S. Let $f(S)$ be the minimum total amount of walking needed to get each person to a different non-destroyed house.

Compute the minimum value of $f(S)$, compute how many sets of houses S achieve this minimum value. Since the number of sets S can be large, output it modulo 998 244 353.

Input

The first line of input contains three integers x, n, and m ($1 \le n < m \le 2 \cdot 10^5, n + m \le x \le 10^9$), where x is the number of points around the circle, n is the number of people, and m is the number of houses. The points are labeled 1 to x, and point x is adjacent to point 1.

The next $n + m$ lines each contain two tokens, an integer p ($1 \le p \le x$) and a character t ($t \in \{\texttt{P}, \texttt{H}\}$), where p denotes the position of a person or house, and t denotes the type of the point, either `P` for person or `H` for house. All positions are distinct, and the positions will be given in increasing order.

Output

Output two lines.

On the first line output the minimum possible value of $f(S)$.

On the second line output the number of sets S that achieve this minimum value, modulo 998 244 353.

Examples

standard input	standard output
6 2 4 1 P 2 H 3 P 4 H 5 H 6 H	2 3
1000000000 2 4 1 P 6 H 31415926 H 999999998 H 999999999 H 1000000000 P	4 1

Note

For the first sample, the minimum total walking distance is 2. We can destroy the set of houses at $\{2, 5\}$, $\{4, 5\}$ or $\{5, 6\}$.

For the second sample, we can destroy the set of houses at $\{6, 31415926\}$ for a minimum total walking distance of 4. Note that even though the minimum walking distance can be achieved in multiple ways, it is only counted once since the set of destroyed houses is the same.