AND Components

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 megabytes

There is an array $A_1, A_2, \ldots, A_N$ consisting of N integers, and 2 binary strings L, R. There will be Q updates, where in each update, the value of some element is changed. Before any updates and after each update, print the answer to the following problem:

Let's create an unoriented graph G consisting of N vertices. For each i, we add up to two edges:

- *With the maximum j such that $j < i$, $A_j \ \& \ A_i > 0$, and $L_i = 1$ holds. If no such j exists or $L_i = 0$, then we do not add this edge.*
- *With the minimum j such that $j > i$, $A_j \ \& \ A_i > 0$, and $R_i = 1$ holds. If no such j exists or $R_i = 0$, then we do not add this edge.*

Find the number of connected components in this graph.

Input

- The first line contains one integer T ($1 \le T \le 10^4$), the number of test cases.
- Then, for each test case:
  - The first line contains two space-separated integers N and Q ($1 \le N, Q \le 10^5$).
  - The second line contains N space-separated integers $A_1, A_2, \ldots, A_N$ ($0 \le A_i \le 10^6$).
  - The third line contains a string consisting of N characters $L_1 L_2 \ldots L_N$ ($L_i \in \{0, 1\}$).
  - The fourth line contains a string consisting of N characters $R_1 R_2 \ldots R_N$ ($R_i \in \{0, 1\}$).
  - Then, Q lines follow, each in one of the following formats:
    - `A` i x ($1 \le i \le N, 0 \le x \le 10^6$): Update the value of A_i to x, i.e., $A_i := x$.
    - `L` i x ($1 \le i \le N, x \in \{0, 1\}$): Update the value of L_i to x, i.e., $L_i := x$.
    - `R` i x ($1 \le i \le N, x \in \{0, 1\}$): Update the value of R_i to x, i.e., $R_i := x$.

It is guaranteed that the sum of N over all test cases does not exceed 10^5.

It is guaranteed that the sum of Q over all test cases does not exceed 10^5.

Output

For each test, print $Q + 1$ lines, each consisting of one integer, the number of connected components. *Note that the first line is the answer before any updates take place!*

Example

standard input	standard output
2 5 4 1 2 4 1 1 10101 11011 A 1 4 A 1 1 L 2 0 A 5 3 4 4 1 1 1 0 1111 1111 A 2 2 R 1 0 L 4 0 A 4 1	3 3 3 3 2 2 3 3 3 2