Problem H. Binary Simulation

Time limit 2000 ms
Mem limit 65536 kB

Given a binary number, we are about to do some operations on the number. Two types of operations can be here:

1. `I i j` , inverts all the bits from **i** to **j** (inclusive).
2. `Q i` return whether the $\mathbf{i}^{\mathbf{th}}$ bit is 0 or 1.

The MSB (most significant bit) is the first bit **(i.e. i=1)**. The binary number can contain leading zeroes.

Input

Input starts with an integer **T (≤ 10)**, denoting the number of test cases.

Each case starts with a line containing a binary integer having length **n** $(\mathbf{1 \le n \le 10^5})$. The next line will contain an integer **q (1 ≤ q ≤ 50000)** denoting the number of queries.

Each query will be either in the form `I i j` where **i, j** are integers and **1 ≤ i ≤ j ≤ n**. Or the query will be in the form `Q i` where **i** is an integer and **1 ≤ i ≤ n**.

Output

For each case, print the case number in a single line. Then for each query `Q i` you have to print 1 or 0 depending on the $\mathbf{i}^{\mathbf{th}}$ bit.

Sample

Input	Output
2 0011001100 6 I 1 10 I 2 7 Q 2 Q 1 Q 7 Q 5 1011110111 6 I 1 10 I 2 7 Q 2 Q 1 Q 7 Q 5	Case 1: 0 1 1 0 Case 2: 0 0 0 1

Note

Dataset is huge, use faster I/O methods.