

Problem F. Making Number

Input file: *standard input*
Output file: *standard output*
Time limit: 1.5 seconds
Memory limit: 1024 mebibytes

You are given two positive integers X and Y of the same length in base 10. Let us define Z as the positive integer in base 10 satisfying the following conditions.

- The digits of Z should be a rearrangement of the digits of X . Leading zeros in Z are not allowed. For example, if $X = 1103$, Z can be 1103 or 3101, but Z cannot be 2110, 301, nor 0131.
- $Y \leq Z$.
- Z is the minimum value satisfying the above conditions.

You have to perform Q queries. Each query is one of the following:

- Given i and x , change the i -th digit of Y into x .
- Given i , output the i -th digit of Z . If there is no such Z , print -1 .

The digits of an integer are numbered from left to right starting from 1. For example, The third digit of 1234 is 3.

Input

The first line contains two space-separated integers, X and Y .

The second line contains a single integer Q , the number of queries.

Each of the following Q lines contains space-separated integers describing the queries. Each line has one of the following forms, where the first integer represents the type of the query:

- “1 i x ”: Change the i -th digit of Y to x .
- “2 i ”: Output the i -th digit of Z . If there is no such Z , print -1 .

It is guaranteed that there is at least one query of type 2.

Let $\text{len}(A)$ be the number of digits in a positive integer A .

- $1 \leq X, Y < 10^{100\,000}$
- $1 \leq Q \leq 100\,000$
- $\text{len}(X) = \text{len}(Y)$
- The first digits of X and Y are not 0.
- For a query of type 1, $1 \leq i \leq \text{len}(Y)$, $0 \leq x \leq 9$, and if $i = 1$, then $x \neq 0$.
- For a query of type 2, $1 \leq i \leq \text{len}(Y)$.

Output

For each query of type 2, output a single line with the answer to the query.

Examples

<i>standard input</i>	<i>standard output</i>
3304 1615 6 2 3 2 4 1 1 3 2 2 1 2 4 2 1	3 4 0 3
838046 780357 10 2 1 2 2 1 2 4 2 3 2 4 1 4 5 2 5 2 6 1 1 9 2 2	8 0 3 4 6 8 -1
2950 9052 4 2 1 2 2 2 3 2 4	9 0 5 2