Problem D
Basic Basis

Time Limit: 2

You are given a sequence of n bit strings $b_1, b_2, \ldots, b_n$, each with $k \times 4$ bits.

You are also given another sequence of m bit strings $a_1, a_2, \ldots, a_m$, each also with $k \times 4$ bits.

Let $f(x)$ denote the minimum index i such that it is possible to take a non-empty subset of $b_1, b_2, \ldots, b_i$, XOR them all together, and get x. If there is no such index, $f(x) = -1$.

Print the values $f(a_1), f(a_2), \ldots, f(a_m)$.

Input

The first line of input contains three integers n ($1 \leq n \leq 1{,}000$), m ($1 \leq m \leq 1{,}000$) and k ($1 \leq k \leq 40$), where n is the length of sequence b, m is the length of sequence a, and the elements of both sequences are bit strings with $k \times 4$ bits.

Each of the next n lines contains a hexadecimal representation of b_i as a string of length k. The strings consist only of hexadecimal digits ('0'–'9' and 'a'–'f').

Then, each of the next m lines contains a hexadecimal representation of a_i in the same format as above.

Output

Output m lines with a single integer on each line, where the integer on the ith line is $f(a_i)$.

Sample Input 1	Sample Output 1
3 5 2 02 e1 fa 02 e3 1b e1 ff	1 2 3 2 -1

Sample Input 2	Sample Output 2
5 6 2 01 02 04 08 10 01 02 03 04 05 64	1 2 2 3 3 -1