517 Word

Dr. R. E. Wright's class was studying modified L-Systems. Let us explain necessary details. As a model let us have words of length n over a two letter alphabet $\{a, b\}$. The words are cyclic, this means we can write one word in any of n forms we receive by cyclic shift, whereby the first and the last letters in the word are considered to be neighbours.

Rewriting rules rewrite a letter at a position i, depending on letters at the positions $i-2, i, i+1$. We rewrite all letters of the word in one step. When we have a given starting word and a set of rewriting rules a natural question is: how does the word look after s rewriting steps?

Help Dr. R. E. Wright and write a program which solves this task.

Input

There are several blocks in the input file, each describing one system. There is an integer number n, $2 < n < 16$ the length of the input word in the first line. There is a word in the next line. The word contains only lowercase letters `a` and `b`. There are four characters $c_1c_2c_3c_4$ in the next eight lines. Each quadruple represents one rewriting rule with the following meaning: when the letter at the position $i-2$ is c_1 and the letter at the position i is c_2 and the letter at the position $i+1$ is c_3 then the letter at the position i after rewriting will be c_4. Rewriting rules are correct and complete. There is an integer number s, $0 \leq s \leq 2000000000$, in the last line of the block.

Output

There is one line corresponding to each block of the input file. The line contains a word which we receive after s rewriting steps from the corresponding starting word using given rewriting rules. As we mentioned above, the word can be written in any of n cyclic shifted forms. The output file contains the lexicographically smallest word, assuming that `a` < `b`.

Sample Input

```
5
aaaaa
aaab
aabb
abab
abbb
baab
babb
bbab
bbbb
1
```

Sample Output

```
bbbbb
```