

Problem I. Prolonged Password

Time limit 2000 ms

Mem limit 1048576 kB

OS Linux

Kang the Penguin has forgotten some letters of his password, help him figure them out!

Of course, Kang knows that something as important as a password should be easy to remember, but it also cannot be too short. Thus, he knows that he originally decided to generate his password in the following manner. First, he starts with some non-empty string S , consisting of lowercase letters only. Then, he chooses 26 non-empty strings T_a, T_b, \dots, T_z , each consisting of at least two lowercase English letters. He defines a function f , which converts each character i to its corresponding string T_i and concatenates the results. For example, if T_a was “abc” and T_b was “cba”, applying f to “aba” would result in the string “abccbaabc”.

Now, he applies f repeatedly to S , applying it K times in total. The final result is his password $P = f^K(S)$.

While he remembers most of his password, he has forgotten M of the letters. The i^{th} letter that he has forgotten is in position m_i in the string P . It is guaranteed that each m_i will be less than or equal to the final length of the password $|P|$. Help Kang to figure out what the forgotten letters are!

Input

The 1st line of the input contains a single lowercase string S , where $1 \leq |S| \leq 1\,000\,000$.

The 2nd line of the input contains 13 strings T_a, T_b, \dots, T_m , separated by spaces, where $2 \leq |T_a|, |T_b|, \dots, |T_m| \leq 50$.

The 3rd line of the input contains 13 strings T_n, T_o, \dots, T_z , separated by spaces, where $2 \leq |T_n|, |T_o|, \dots, |T_z| \leq 50$.

The strings T_a, T_b, \dots, T_z each contains only lowercase English characters (a–z).

The 4th line of the input contains a single integer K , where $1 \leq K \leq 10^{15}$.

The 5th line of the input contains a single integer M , where $1 \leq M \leq 1\,000$.

The 6th line of the input contains M integers, the i^{th} of which is the integer m_i , where $1 \leq m_i \leq \min(|f^K(S)|, 10^{15})$.

Output

Output M lines, each containing a single lowercase character. The i^{th} line of the output should contain the letter in the m_i^{th} position of the password P .

Sample 1

Input	Output
abca bc cd da dd ee ff gg hh ii jj kk ll mm nn oo pp qq rr ss tt uu vv ww xx yy zz 1 2 1 8	b c

Sample 2

Input	Output
ab ba ab cc dd ee ff gg hh ii jj kk ll mm nn oo pp qq rr ss tt uu vv ww xx yy zz 2 2 1 8	a b