Problem A. Restore the string

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Jonathan tried to write Rabin-Karp algorithm. He had a string S and he used the following formula to calculate hash of string:

$$\sum_{i=0}^{|S|-1} (S_i - 97) \cdot 2^i$$

Thus, he has written hashes of all prefixes of string S. Unfortunately, Jonathan forgot his string S. So, he asked your help in restoring this string.

Input

The first line of the input contains the only integer N - the length of string S ($1 \leqslant N \leqslant 50$).

The second line contains N integers p_i - hashes of all prefixes of string S.

It is guaranteed that each hash does not exceed $2 \cdot 10^{18}$.

Output

Print the string S.

Examples

standard input	standard output
5 7 15 59 147 371	hello
5 22 50 118 206 254	world

Problem B. Forgotten password

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Jonathan forgot his password to Q of his website accounts, the only thing he remember is several last letters of his password for each account. Also Jonathan has a list of passwords that he use to authorize to different websites. He wants to know how many passwords should he bruteforce to authorize each website. Please, help him find this numbers.

Input

The first line of the input contains two integers N and Q - number of passwords in Jonathan's list and the number of websites to authorize.

Each of the next N lines contains one string s_i - password in the list.

Each of the next Q lines contains one string t_i - last symbols of his real password to the i_{th} account.

It is guaranteed that $\sum_{i=1}^{n} |s_i| \leqslant 2 \cdot 10^5$ and $\sum_{i=1}^{q} |t_i| \leqslant 2 \cdot 10^5$, e.g. both sum of lengths of all passwords and sum of lengths of all last-symbols-strings does not exceed $2 \cdot 10^5$.

It is also guaranteed that all strings consist of only lowercase latin letters.

Output

Please, output the number of suitable passwords to each of the Jonathan's website accounts.

Examples

standard input	standard output
4 2 september october november december ber mber	4 3
4 4 stay hungry stay foolish stay tay ay y	2 2 2 3

Problem C. Pen-pineapple-apple-pen

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Jonathan has recently seen 'PPAP' music video by Pikotaro. He has two strings and he decided to concatenate them. But the way he wants to do that is unusual. If the second string starts with the same symbols as the first string ends, then this substring is common for both strings. Jonathan wants to avoid duplication of common substring in resulting string. If there are multiple appropriate concatenations, Jonathan chooses one with the longest common part. If there is no common part, he just concatenate them in a usual way. Please, help Jonathan obtain new string.

Input

The only line of the input contains two strings S and T ($1 \leqslant |S|, |T| \leqslant 1000$).

Output

Print the resulting string - concatenation of strings S and T.

Examples

standard input	standard output
pen pineapple	penpineapple
pineapple apple	pineapple
pineapple lemon	pineapplemon

Problem D. Mortal Kombat

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Jonathan likes playing videogames. One of his favorite games is Mortal Kombat. In this game in addition to usual hits, any character can make a super hit if player does special sequence of clicks. Also, combo hits can be performed. Combo is an uninterrupted sequence of super hits. So, you know the sequence of clicks that must be made in order to complete super hit playing for the character Jonathan has chosen and know the sequence of clicks that he made during last round. Please, help Jonathan count the longest combo that he performed.

Input

The first line of input contains string S - sequence of clicks for super hit.

Next line contains string T - sequence of clicks that Jonathan made in last round.

It is guaranteed, that $1 \leqslant |S| \leqslant |T| \leqslant 10^5$.

It is also guaranteed, that strings consist of only lowercase latin letters.

Output

Print the longest combo for the Jonathan in the last round.

Examples

standard input	standard output
a aabaaa	3
aba abababa	1