

Problem A. Prefix Function

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

Compute prefix function for given string s .

Input

Single line contains a string s containing only letters ($1 \leq |s| \leq 10^6$).

Output

Output values of the prefix function for string s for indices $1, 2, \dots, |s|$.

Example

standard input	standard output
aaaAAA	0 1 2 0 0 0

Problem B. Z-function

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

Compute Z-function for given string s .

Input

Single line contains string s containing only letters ($1 \leq |s| \leq 10^6$).

Output

Output values of the Z-function for string s for indices $2, 3, \dots, |s|$.

Examples

standard input	standard output
aaaAAA	2 1 0 0 0
abacaba	0 1 0 3 0 1

Problem C. Fast substring search

Input file: `standard input`
Output file: `standard output`
Time limit: 2 seconds
Memory limit: 256 megabytes

For two strings s and t find all the occurrences of the string s in the string t .

Input

First line contains string s , second — t ($1 \leq |s|, |t| \leq 10^6$). Strings consist of lowercase english letters.

Output

On the first line output number of occurrences of string s in string t . On the second line output all indices where string s occurs in the string t in ascending order, indices begin from 1.

Example

standard input	standard output
aba	2
abaCaba	1 5

Problem D. Period

Input file: `standard input`
Output file: `standard output`
Time limit: 2 seconds
Memory limit: 256 megabytes

For given string s find it's period, i.e. minimum string t , such that s can be represented as one or more concatenations of string t .

Input

Single line consists of string s , containing only letters ($1 \leq |s| \leq 10^6$).

Output

Output length of the string t .

Examples

standard input	standard output
abcbabcabc	3
abacaba	7

Problem E. Substrings

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 256 megabytes

For given string s and m requests check, if corresponding substrings $[a..b]$ and $[c..d]$ are equal.

Input

First line contains string s ($1 \leq |s| \leq 10^5$).

Second line contains a single integer m — number of requests ($0 \leq m \leq 10^5$).

Each of next m lines contains four integers — a, b, c, d ($1 \leq a \leq b \leq |s|, 1 \leq c \leq d \leq |s|$).

Output

For each request output “**Yes**”, if corresponding strings are equal, and “**No**” — otherwise.

Example

standard input	standard output
trololo	Yes
3	Yes
1 7 1 7	No
3 5 5 7	
1 1 1 5	

Problem F. Substrings-3

Input file: `standard input`
Output file: `standard output`
Time limit: 2 seconds
Memory limit: 256 megabytes

You are given K strings of small english letters. Find their longest common substring.

Input

First line has a single integer K ($1 \leq K \leq 10$).

Next K lines hold K given strings (each string is at least 1 and at most 10 000 characters long).

Output

Output longest common substring

Example

standard input	standard output
3 abacaba mycabarchive acabistrue	cab

Problem G. Keep It Counted

Input file: `keepcounted.in`
Output file: `keepcounted.out`
Time limit: 2 seconds
Memory limit: 256 megabytes

Vova likes algorithms that deal with strings. He usually prepares programming contests devoted to string-based algorithms. One day, he prepared such a contest and showed it to Pasha.

Pasha, in turn, does not like string-based algorithms, but he likes hash functions. He solved the most difficult problem of the contest with a help of a hash function.

Vova is furious about that. He wants to create a test that will make Pasha's solution get "Time limit exceeded" verdict. He knows that the main idea of this solution and wants to create a string S that has a vast number of distinct substrings in any of its prefixes.

Now Vova needs a program that will count the number of distinct substrings for each prefix of the given string S . You are to write such program.

Input

The only line of input contains a nonempty string S consisting of N ($1 \leq N \leq 10^4$) lowercase English letters.

Output

Output N lines. On i -th line, output the number of distinct substrings of i -th prefix of string S .

Examples

<code>keepcounted.in</code>	<code>keepcounted.out</code>
<code>aabab</code>	1
	2
	5
	8
	11
<code>atari</code>	1
	3
	5
	9
	14

Problem H. Necklace

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

Bessie the cow has arranged a string of n rocks, each containing a single letter of the alphabet, that she wants to build into a fashionable necklace.

Being protective of her belongings, Bessie does not want to share her necklace with the other cow currently living on her side of the barn. The other cow has a name that is a string of m characters, and Bessie wants to be sure that this length- m string does not occur as a contiguous substring anywhere within the string representing her necklace (otherwise, the other cow might mistakenly think the necklace is for her). Bessie decides to remove some of the rocks in her necklace so that the other cow's name does not appear as a substring. Please help Bessie determine the minimum number of rocks she must remove.

Input

The first line is a length- n string describing Bessie's initial necklace; each character is in the range a through z .

The second line is the length- m name of the other cow in the barn, also made of characters from a to z .

Output

The minimum number of stones that need to be removed from Bessie's necklace so that it does not contain the name of the other cow as a substring.

Example

standard input	standard output
ababaa aba	1