Problem A. Alice and Bob (and string)

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Alice and Bob are playing a game where they start with the string S. Afterwards, the first player chooses another string T that is a substring of the string S. Each player's turn consists of adding one character to the **end** of the T string in such a way that, after each turn, string T is a substring of the string S. The player who can't make a move, loses. Alice goes first. Before she plays the first turn, she has the right to choose the initial string T. Of course, Alice wants to cheat and choose a string which will lead her to victory, but she doesn't want Bob to suspect anything. Given k, Alice needs to choose the k^{th} lexicographically starting string among all the winning strings. Help Alice!

Input

In the first line, given string S from lowercase latin letters. In the second line, given integer K.

Constraints

$1 \leq |S| \leq 10^5$

$1 \leq K \leq 10^9$

Output

Print only one line; the answer to the problem. If there is no answer, print *no solution*. If the answer is an empty string, print -.

Examples

standard input	standard output
abac 3	aba
adamant 20	No solution.

Note

There are 4 winning strings in the first case: {*"", "a", "aba", "ba"*}

Problem B. Alice and Bob (and string) 2

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Alice and Bob are playing a game where they start with the string S. Afterwards, the first player chooses another string T that is a substring of the string S. Each player's turn consists of adding one character to the **beginning** of the T string in such a way that, after each turn, string T is a substring of the string S. The player who can't make a move, loses. Alice goes first. Before she plays the first turn, she has the right to choose the initial string T. Of course, Alice wants to cheat and choose a string which will lead her to victory, but she doesn't want Bob to suspect anything. Given k, Alice needs to choose the k^{th} lexicographically starting string among all the winning strings. Help Alice!

Input

In the first line, given string S from lowercase latin letters. In the second line, given integer K.

Constraints

$1 \leq |S| \leq 10^5$

$1 \leq K \leq 10^9$

Output

Print only one line; the answer to the problem. If there is no answer, print *no solution*. If the answer is an empty string, print -.

Examples

standard input	standard output
abac 3	ba

Note

There are 5 winning strings in the first case: {*"", "b", "ba", "bac", "c"*}

Problem C. Substring

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Given string s. You are to answer n queries of kind is there any occurence of string t in the substring of s starting in position l and ending in position r.

Input

First line of input contains string s ($1 \le |s| \le 100\,000$).

Second line contains integer n which is the total amount of queries ($1 \le n \le 100\,000$). Following n lines contain two integers l_i, r_i and the string t_i.

All strings in input consist only from lowercase latin letters. Total length of t_i does not exceed 100 000.

Output

Output the only line i^th character in it is '-' if t_i doesn't occur in substring or '+' if it does.

Examples

standard input	standard output
frommarsiam 3 6 10 i 2 11 am 1 9 human	++-

Problem D. Refrain

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Consider sequence of n integers from 1 to m. Its contiguous subsequence of integers is called *refrain* if product of its length and amount of its occurrences in the string is maximum possible.

You are given sequence and you are asked about its refrain.

Input

First line of input contains two integers n, m ($1 \le n \le 150000$, $1 \le m \le 10$). Second line contains n integers from 1 to m.

Output

First line has to contain product of refrain's length and its amount of occurrences. Second string has to contain length of refrain. Third line has to contain sequence which is refrain.

Examples

standard input	standard output
9 3 1 2 1 2 1 3 1 2 1	9 3 1 2 1

Problem E. Average Common Prefix

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Let T denote some string of length n consisting of capital Latin letters. Let $Shift(T, k)$ denote the left cyclic shift of T by $k-1$ positions. The permutation array for T is an array $P[1..n]$ such that $Shift(T, P[1]), Shift(T, P[2]), ..., Shift(T, P[n])$ is a list of cyclic shifts of T sorted in lexicographical order. For given two strings v and w we define $LCP(v, w)$ as the length of their longest common prefix. The Average LCP of the string T is the average length of longest common prefix between two consecutive shifts:

$$\text{Average LCP} = \frac{1}{n-1}\sum_{i=1}^{n-1} \text{LCP}(\text{Shift}(\text{T}, \text{P}[i]), \text{Shift}(\text{T}, \text{P}[i+1]))$$

Example. **T** = 'MISSISSIPPI', **n** = 11:

i	P[i]	Shift(T, P[i])	LCP
1	11	'IMISSISSIPP'	1
2	8	'IPPIMISSISS'	1
3	5	'ISSIPPIMISS'	4
4	2	'ISSISSIPPIM'	0
5	1	'MISSISSIPPI'	0
6	10	'PIMISSISSIP'	1
7	9	'PPIMISSISSI'	0
8	7	'SIPPIMISSIS'	2
9	4	'SISSIPPIMIS'	1
10	6	'SSIPPIMISSI'	3
11	3	'SSISSIPPIMI'	

Average LCP of 'MISSISSIPPI' is 1.3

Input

The first line of the input contains integer $n(2 \le n \le 250001)$. The second line contains string T.

Output

The only line of the output should contain the $AverageLCP$ of T with 3 digits after decimal point.

Examples

standard input	standard output
11 MISSISSIPPI	1.300

Problem F. Bacon's Cypher

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 mebibytes

Programmer Vasya was down on his luck. Instead of a vacation, he was sent to a scientific conference.

"It is necessary to increase your competence," his boss said, "it's an important conference on cryptography, and it's held in France, where they used encryption in the days of de Richelieu and cracked codes in the days of Viete."

One of the talks at the conference was about the attempts to solve Bacon's cyphers. The speaker proposed a hypothesis that the key to Bacon's secrets could be found if all possible substrings of Bacon's works were analyzed.

"But there are too many of them!" Vasya expressed his astonishment.

"Not as many as you think," the speaker answered, "count them all and you'll see it yourself."

That evening Vasya found on the Web the complete set of Bacon's works. He wrote a program that converted the texts into one long string by removing all linebreaks, spaces, and punctuation marks. And now Vasya is confused because he doesn't know how to calculate the number of different substrings of this string.

Input

You are given a nonempty string consisting of lowercase English letters. The string is no longer than 5000 symbols.

Output

Output the number of different substrings of this string.

Examples

standard input	standard output
aaba	8

Problem G. Mnemonics and Palindromes 3

Input file:	*standard input*
Output file:	*standard output*
Time limit:	0.5 seconds
Memory limit:	64 mebibytes

As you remember, when Vasechkin was preparing a problem for the latest student contest, he spent a lot of time trying to invent an unusual and complex name for this problem. The name that Vasechkin had invented was so complex that none of the participants of that contest even started reading the statement of his problem.

After the contest, Chairman of the program committee announced that he refused to take part in the preparation of contests as long as such inappropriate people as Vasechkin worked on the program committee. That was how Vasechkin became the new Chairman of the program committee, and now he is preparing the next programming contest.

Vasechkin has decided that this time the names of all the problems will consist of the letters a, b, and c only and the length of each name will be equal to n. In addition, the names must be *extremely complex*. A name is extremely complex if none of its substrings consisting of at least two symbols is a palindrome. Help Vasechkin find all extremely complex names for the problems of the contest.

Input

The only input line contains the integer n ($1 \leqslant n \leqslant 20\,000$).

Output

Output all different extremely complex names of length n consisting of the letters a, b, and c only. The names should be given in the alphabetical order, one per line. If the total length of the names exceeds 100 000 letters, output the only line *TOO LONG*.

Examples

standard input	standard output
2	ab ac ba bc ca cb