Codeforces Beta Round #98 (Div. 2)

A. Postcards and photos

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Polycarpus has postcards and photos hung in a row on the wall. He decided to put them away to the closet and hang on the wall a famous painter's picture. Polycarpus does it like that: he goes from the left to the right and removes the objects consecutively. As Polycarpus doesn't want any mix-ups to happen, he will not carry in his hands objects of two different types. In other words, Polycarpus can't carry both postcards and photos simultaneously. Sometimes he goes to the closet and puts the objects there, thus leaving his hands free. Polycarpus must put **all** the postcards and photos to the closet. He cannot skip objects. What minimum number of times he should visit the closet if he cannot carry more than 5 items?

Input

The only line of the input data contains a non-empty string consisting of letters "C" and "P" whose length does not exceed 100 characters. If the i-th character in the string is the letter "C", that means that the i-th object (the numbering goes from the left to the right) on Polycarpus' wall is a postcard. And if the i-th character is the letter "P", than the i-th object on the wall is a photo.

Output

Print the only number — the minimum number of times Polycarpus has to visit the closet.

Examples

input
CPCPCPC
output
7

input
CCCCCCPPPPPP
output
4

input
CCCCCCPPCPPPPPPPPP
output
6

input
CCCCCCCCCC
output
2

Note

In the first sample Polycarpus needs to take one item to the closet 7 times.

In the second sample Polycarpus can first take 3 postcards to the closet; then 3 more. He can take the 6 photos that are left in the similar way, going to the closet twice.

In the third sample Polycarpus can visit the closet twice, both times carrying 3 postcards. Then he can take there 2 photos at once, then one postcard and finally, he can carry the last 10 photos if he visits the closet twice.

In the fourth sample Polycarpus can visit the closet twice and take there all 10 postcards (5 items during each go).

B. Permutation

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

"Hey, it's homework time" — thought Polycarpus and of course he started with his favourite subject, IT. Polycarpus managed to solve all tasks but for the last one in 20 minutes. However, as he failed to solve the last task after some considerable time, the boy asked you to help him.

The sequence of n integers is called a permutation if it contains all integers from 1 to n exactly once.

You are given an arbitrary sequence $a_1, a_2, \ldots, a_n$ containing n integers. Each integer is not less than 1 and not greater than 5000. Determine what minimum number of elements Polycarpus needs to change to get a permutation (he should not delete or add numbers). In a single change he can modify any single sequence element (i. e. replace it with another integer).

Input

The first line of the input data contains an integer n ($1 \le n \le 5000$) which represents how many numbers are in the sequence. The second line contains a sequence of integers a_i ($1 \le a_i \le 5000, 1 \le i \le n$).

Output

Print the only number — the minimum number of changes needed to get the permutation.

Examples

input
3 3 1 2
output
0

input
2 2 2
output
1

input
5 5 3 3 3 1
output
2

Note

The first sample contains the permutation, which is why no replacements are required.

In the second sample it is enough to replace the first element with the number 1 and that will make the sequence the needed permutation.

In the third sample we can replace the second element with number 4 and the fourth element with number 2.

C. History

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Polycarpus likes studying at school a lot and he is always diligent about his homework. Polycarpus has never had any problems with natural sciences as his great-great-grandfather was the great physicist Seinstein. On the other hand though, Polycarpus has never had an easy time with history.

Everybody knows that the World history encompasses exactly n events: the i-th event had continued from the year a_i to the year b_i inclusive ($a_i < b_i$). Polycarpus easily learned the dates when each of n events started and ended (Polycarpus inherited excellent memory from his great-great-granddad). But the teacher gave him a more complicated task: Polycaprus should know when all events began and ended and he should also find out for each event whether it includes another event. Polycarpus' teacher thinks that an event j includes an event i if $a_j < a_i$ and $b_i < b_j$. Your task is simpler: find the number of events that are included in some other event.

Input

The first input line contains integer n ($1 \le n \le 10^5$) which represents the number of events. Next n lines contain descriptions of the historical events, one event per line. The $i + 1$ line contains two integers a_i and b_i ($1 \le a_i < b_i \le 10^9$) — the beginning and the end of the i-th event. No two events start or finish in the same year, that is, $a_i \neq a_j$, $a_i \neq b_j$, $b_i \neq a_j$, $b_i \neq b_j$ for all i, j (where $i \neq j$). Events are given in arbitrary order.

Output

Print the only integer — the answer to the problem.

Examples

input
5 1 10 2 9 3 8 4 7 5 6
output
4

input
5 1 100 2 50 51 99 52 98 10 60
output
4

input
1 1 1000000000
output
0

Note

In the first example the fifth event is contained in the fourth. Similarly, the fourth event is contained in the third, the third — in the second and the second — in the first.

In the second example all events except the first one are contained in the first.

In the third example only one event, so the answer is 0.

D. Palindromes

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Friday is Polycarpus' favourite day of the week. Not because it is followed by the weekend, but because the lessons on Friday are 2 IT lessons, 2 math lessons and 2 literature lessons. Of course, Polycarpus has prepared to all of them, unlike his buddy Innocentius. Innocentius spent all evening playing his favourite game Fur2 and didn't have enough time to do the literature task. As Innocentius didn't want to get an F, he decided to do the task and read the book called "Storm and Calm" during the IT and Math lessons (he never used to have problems with these subjects). When the IT teacher Mr. Watkins saw this, he decided to give Innocentius another task so that the boy concentrated more on the lesson and less — on the staff that has nothing to do with IT.

Mr. Watkins said that a palindrome is a string that can be read the same way in either direction, from the left to the right and from the right to the left. A concatenation of strings a, b is a string ab that results from consecutive adding of string b to string a. Of course, Innocentius knew it all but the task was much harder than he could have imagined. Mr. Watkins asked change in the "Storm and Calm" the minimum number of characters so that the text of the book would also be a concatenation of no more than k palindromes. Innocentius can't complete the task and therefore asks you to help him.

Input

The first input line contains a non-empty string s which is the text of "Storm and Calm" (without spaces). The length of the string s does not exceed 500 characters. String s consists of uppercase and lowercase Latin letters. The second line contains a single number k ($1 \le k \le |s|$, where $|s|$ represents the length of the string s).

Output

Print on the first line the minimum number of changes that Innocentius will have to make. Print on the second line the string consisting of no more than k palindromes. Each palindrome should be non-empty and consist of uppercase and lowercase Latin letters. Use the character "+" (ASCII-code 43) to separate consecutive palindromes. If there exist several solutions, print any of them.

The letters' case does matter, that is an uppercase letter is **not** considered equivalent to the corresponding lowercase letter.

Examples

input
abacaba 1
output
0 abacaba

input
abdcaba 2
output
1 abdcdba

input
abdcaba 5
output
0 a+b+d+c+aba

input
abacababababbcbabcd 3
output
1 abacaba+babab+bcbabcb

E. Last Chance

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Having read half of the book called "Storm and Calm" on the IT lesson, Innocentius was absolutely determined to finish the book on the maths lessons. All was fine until the math teacher Ms. Watkins saw Innocentius reading fiction books instead of solving equations of the fifth degree. As during the last maths class Innocentius suggested the algorithm of solving equations of the fifth degree in the general case, Ms. Watkins had no other choice but to give him a new task.

The teacher asked to write consecutively (without spaces) all words from the "Storm and Calm" in one long string S. She thought that a string is good if the number of vowels in the string is no more than twice more than the number of consonants. That is, the string with V vowels and C consonants is good if and only if $V \leq 2C$.

The task Innocentius had to solve turned out to be rather simple: he should find the number of the longest good substrings of the string S.

Input

The only input line contains a non-empty string S consisting of no more than $2 \cdot 10^5$ uppercase and lowercase Latin letters. We shall regard letters "a", "e", "i", "o", "u" and their uppercase variants as vowels.

Output

Print on a single line two numbers without a space: the maximum length of a good substring and the number of good substrings with this length. If no good substring exists, print "No solution" without the quotes.

Two substrings are considered different if their positions of occurrence are different. So if some string occurs more than once, then it should be counted more than once.

Examples

input
Abo
output
3 1

input
OEIS
output
3 1

input
auBAAbeelii
output
9 3

input
AaaBRAaaCAaaDAaaBRAaa
output
18 4

input
EA
output
No solution

Note

In the first sample there is only one longest good substring: "Abo" itself. The other good substrings are "b", "Ab", "bo", but these substrings have shorter length.

In the second sample there is only one longest good substring: "EIS". The other good substrings are: "S", "IS".