

DNA Value



DNA sequence chains are made of nucleobases or nucleotides namely **Guanine**, **Adenine**, **Cytosine** and **Thymine** and substrings in a DNA sequence are often indicative of amino acid chains, i.e proteins.

Your goal is to find the longest prefix that repeats itself before and after each position, with the prefix overlapping at that position alone. In other words, if you are looking at the sequence item i , the substring ending at position i : $s[i - k + 1, i]$ is the same as the substring beginning at position i : $s[i, i + k - 1]$. Both of those substrings must match a k length prefix: $s[0, k - 1]$. The length you are looking for is the length of the longest substring for which all three conditions hold, i.e

For example, consider the following arbitrary nucleotide sequence. For each index i , the largest possible value of k is shown below it.

k	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	G	A	G	C	G	A	G	A	G	A	G	C	G	A	G
	1	0	1	0	1	0	3	0	3	0	1	0	1	0	1

You first compute all of the $s[0, k - 1]$ substrings, k being the length of a substring:

```
k substring
0 G
1 GA
2 GAG
...
14 GAGCGAGAGAGCGAG
```

Then you can start working on the other tests:

i	k	$s[i - k + 1, i]$	$s[i, i + k - 1]$	match	Length
0	1	G	G	True	1
1	1	A	A	False	
1	2	GA	AG	False	0

Complete the function **piVsZ** which accepts an input string and returns an integer array denoting the largest value of k for each character of the input string.

Input Format

Input contains single string s consisting of lowercase English letters, *ascii*($a \dots z$).

Constraints

Length of s doesn't exceed $5 \cdot 10^5$

Output Format

Output $|s|$ integers for each i between 0 and $|s| - 1$: maximum integer k , such that $s[i - k + 1, i] = s[i, i + k - 1] = s[0, k - 1]$.

Sample Input 0

```
babbabababb
```

Sample Output 0

```
1 0 1 1 0 3 0 3 0 1 1
```

Explanation 0

For the string $s = \text{babbabababb}$, for every index i , the largest value of k is computed such that $s[i - k + 1, i] = s[i, i + k - 1] = s[0, k - 1]$.

For example,

- For $i = 0$, at $k = 1$, $s[0, 0] = s[0, 0] = s[0, 0] = b$. Hence the largest value of k to satisfy the condition is 1.
- For $i = 1$, no such k is feasible, hence resulting in \emptyset and $k = 0$.
- For $i = 5$, two values of k , 1 and 3, satisfy the given condition. In such a case, $k = 3$, the largest value of k should be chosen.

The table below illustrates how k is computed for every character in the string.

Note: \emptyset denotes empty/null set.

i	k	$s[i - k + 1, i]$	$s[i, i + k - 1]$	$s[0, k - 1]$
0	1	b		b
1	\emptyset	\emptyset		\emptyset
2	1	b		b
3	1	b		b
4	\emptyset	\emptyset		\emptyset
5	3	bab		bab
6	\emptyset	b		b
7	3	bab		bab
8	\emptyset	\emptyset		\emptyset
9	1	b		b
10	1	b		b