

PDSP Assignment 6

22 November 2023, due 27 November 2023

Write a Python program to solve the following problem. Submit your source code as a single file on Moodle.

Find the longest palindrome

As we all know, a *palindrome* is a word that equals its reverse. Here are some examples of palindromes: malayalam, gag, appa, amma.

We consider any sequence consisting of the letters of the English alphabet to be a word. So axxb, abbba and bbbccddx are words for our purpose. And aaabbaaa, abbba and bbb are examples of palindromes.

By a *subword* of a word, we mean a contiguous subsequence of the word. For example the subwords of the word abbba are a, b, ab, bb, ba, abb, bbb, bba, abbb, bbba and abbba.

In this task you will given a word and you must find the longest subword of this word that is also a palindrome.

For example if the given word is abbba then the answer is abbba. If the given word is abcbcabbacba then the answer is bcabbacb.

Input format

The first line of the input contains a single integer N indicating the length of the word. The following line contains a single word of length N , made up of the letters a, b, ..., z.

Output format

The first line of the output must contain a single integer indicating the length of the longest subword of the given word that is a palindrome. The second line must contain a subword that is a palindrome and which of maximum length. If there is more than one subword palindrome of maximum length, print the one that is lexicographically smallest (i.e., smallest in dictionary order).

Test Data

You may assume that $1 \leq N \leq 5000$. You may further assume that in 30% of the inputs $1 \leq N \leq 300$.

Example

We illustrate the input and output format using the above examples:

Sample Input 1

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5
abbba
```

Sample Output 1

```
5
abbba
```

Sample Input 2

```
12
abcbcabba
```

Sample Output 2

```
8
bcabbacb
```