

6_跑馬燈 (Marquee)

(2分/4分/14分)

時間限制: 1 second

記憶體限制: 512 MB

題目敘述

將一生奉獻給回文的師老師總是沒日沒夜的埋首於回文字串的研究，師老師的研究筆記上是這樣寫的：「一個回文字串就是正著念與倒著念都一樣的字串，舉例來說：『師老師』就是一個回文字串」。然而、龐大的工作量與長期的睡眠缺乏終於讓師老師病倒了，僅存一絲氣息的師老師看見了人生跑馬燈。

師老師的人生跑馬燈反覆顯示著字串 S ，也就是說，字串中的最後一個字後面會接著字串中的第一個字、週而復始。然而由於跑馬燈的寬度只有 N ，只能顯示 S 中的一部份。舉例來說，如果跑馬燈以 s_i 作為開頭，則跑馬燈顯示的字串 T_i 就會是

$$T_i = s_i s_{(i+1)\%|S|} \dots s_{(i+N-1)\%|S|} \quad (1)$$

師老師看到跑馬燈之後對回文產生了新的疑問：「從 S 的不同位置開頭顯示的字串各自究竟有幾個回文字子串呢？」正式一點來說，就是對每個從 i 開頭的字串 $T_i = t_{i,0} t_{i,1} \dots t_{i,N-1}$ ，我們要計算有幾組不同的整數數對 (ℓ, r) 滿足 $0 \leq \ell \leq r \leq N-1$ 使得

$$t_{i,\ell} t_{i,\ell+1} \dots t_{i,r} \quad (2)$$

是一個回文字串。醫生認為只要解答了這個問題，師老師很可能可以使用意志力來戰勝病魔。為了拯救師老師，請告訴他這個問題的答案吧！

輸入格式

輸入的第一行包含一個正整數 N ，代表跑馬燈的寬度。

第二行則包含一個字串 S ，代表跑馬燈顯示的文字。

輸出格式

輸出 $|S|$ 行，每行輸出一個整數，其中第 i 行的輸出代表以 s_i 開頭的跑馬燈顯示的字串 t_i 中的回文字子串個數。

資料範圍

- $1 \leq |S| \leq 100\,000$ 。
- $1 \leq N \leq |S|$ 。
- 字串 S 中只包含小寫英文字母。

子任務

- 子任務 1, $|S| \leq 200$ 。
- 子任務 2, $|S| \leq 5000$ 。
- 子任務 3, 無額外限制。

測試範例

輸入範例 1

```
5
abcbaa
```

輸出範例 1

```
7
7
8
9
8
7
```

輸入範例 2

```
7
cababac
```

輸出範例 2

```
12
12
11
11
11
11
12
```

範例說明

在範例 1 中，跑馬燈顯示的六種樣式分別為：

- $T_0 = \text{abcba}$ ：有 7 個不同的回文子字串，除了五組 (p, p) 之外的還有 $(0, 4)$ 以及 $(1, 3)$ 。
- $T_1 = \text{bcbaa}$ ：有 7 個不同的回文子字串，除了五組 (p, p) 之外的還有 $(0, 2)$ 以及 $(3, 4)$ 。
- $T_2 = \text{cbaaa}$ ：有 8 個不同的回文子字串。
- $T_3 = \text{baaab}$ ：有 9 個不同的回文子字串。
- $T_4 = \text{aaabc}$ ：有 8 個不同的回文子字串。
- $T_5 = \text{aabc b}$ ：有 7 個不同的回文子字串。

6_Marquee

(2 points/4 points/14 points)

Time Limit: 1 second

Memory Limit: 512 MB

Description

Dr.D dedicated his entire life to the study of palindromes, spending countless days and nights buried in research on palindrome strings. In his research notes, Dr.D wrote, "A palindrome string is a string that reads the same forward and backward. For example, 'DrD' is a palindrome string." However, the massive workload and lack of sleep eventually caused Dr.D to fall ill, and with only a breath left, he saw the marquee of his life.

The marquee of his life repeatedly displays a string S , starting from the beginning each time the end is reached. However, due to the marquee's width being limited to N , only a part of S can be displayed. For instance, if the marquee starts with s_i , then the displayed string T_i would be

$$T_i = s_i s_{(i+1)\%|S|} \dots s_{(i+N-1)\%|S|} \quad (3)$$

Upon seeing the marquee, Dr.D developed a new question about palindromes: "How many palindromic substrings are there for each string that is displayed by starting from different positions in S ?" Formally, for each start point i , we can find a string $T_i = t_{i,0} t_{i,1} \dots t_{i,N-1}$, and we should find the number of distinct pairs of integers (ℓ, r) satisfying $0 \leq \ell \leq r \leq N-1$ such that

$$t_{i,\ell} t_{i,\ell+1} \dots t_{i,r} \quad (4)$$

is a palindrome. The doctor believed that if Dr.D figure out the answer to this question, he could potentially overcome his illness with willpower. Please help to save Dr.D by providing the answer to this question!

Input Format

The input contains two lines.

The first line contains a single integer N , representing the width of the marquee.

The second line contains a string S , representing the text displayed on the marquee.

Output Format

Output $|S|$ lines, each line containing an integer. The output on the i -th line represents the number of palindrome substrings in the string T_i displayed on the marquee, where T_i starts with s_i .

Constraints

- $1 \leq |S| \leq 100\,000$.
- $1 \leq N \leq |S|$.
- The string S contains only lowercase Latin letters.

Subtasks

- Subtask 1, $|S| \leq 200$.
- Subtask 2, $|S| \leq 5000$.
- Subtask 3, No additional constraints.

Test Cases

Input 1

```
5
abcbaa
```

Output 1

```
7
7
8
9
8
7
```

Input 2

```
7
cababac
```

Output 2

```
12
12
11
11
11
11
12
```

Illustrations

In example 1, all T_i displayed on marquee are:

- $T_0 = \text{abcba}$: There are 7 distinct palindrome substrings, including five pairs of (p, p) , as well as $(0, 4)$ and $(1, 3)$ as additional pairs.

- $T_1 = \mathbf{bcbaa}$: There are 7 distinct palindrome substrings, including five pairs of (p, p) , as well as $(0, 2)$ and $(3, 4)$ as additional pairs.
- $T_2 = \mathbf{cbaaa}$: There are 8 distinct palindrome substrings.
- $T_3 = \mathbf{baaab}$: There are 9 distinct palindrome substrings.
- $T_4 = \mathbf{aaabc}$: There are 8 distinct palindrome substrings.
- $T_5 = \mathbf{aabcb}$: There are 7 distinct palindrome substrings.