

3026 Period

For each prefix of a given string S with N characters (each character has an ASCII code between 97 and 126, inclusive), we want to know whether the prefix is a periodic string. That is, for each i ($2 \leq i \leq N$) we want to know the largest $K > 1$ (if there is one) such that the prefix of S with length i can be written as A^K , that is A concatenated K times, for some string A . Of course, we also want to know the period K .

Input

The input file consists of several test cases. Each test case consists of two lines. The first one contains N ($2 \leq N \leq 1000000$) the size of the string S . The second line contains the string S . The input file ends with a line, having the number zero on it.

Output

For each test case, output 'Test case #' and the consecutive test case number on a single line; then, for each prefix with length i that has a period $K > 1$, output the prefix size i and the period K separated by a single space; the prefix sizes must be in increasing order. Print a blank line after each test case.

Sample Input

```
3
aaa
12
aabaabaabaab
0
```

Sample Output

```
Test case #1
2 2
3 3

Test case #2
2 2
6 2
9 3
12 4
```