## Period

For each prefix of a given string $\boldsymbol{S}$ with $\boldsymbol{N}$ 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 $\boldsymbol{i}$ ( $2<=\boldsymbol{i}<=\boldsymbol{N}$ ) we want to know the largest $\boldsymbol{K}>1$ (if there is one) such that the prefix of $\boldsymbol{S}$ with length $\boldsymbol{i}$ can be written as $\boldsymbol{A}^{\boldsymbol{K}}$, that is $\boldsymbol{A}$ concatenated $\boldsymbol{K}$ times, for some string $\boldsymbol{A}$. Of course, we also want to know the period $\boldsymbol{K}$.

## Input

The first line of the input file will contains only the number $T(1<=T<=10)$ of the test cases.
Each test case consists of two lines. The first one contains $\boldsymbol{N}(2<=\boldsymbol{N}<=1000000)$ - the size of the string $\boldsymbol{S}$. The second line contains the string $\boldsymbol{S}$.

## Output

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

## Example

Input:
2
3
aaa
12
aabaabaabaab

## Output:

Test case \#1
22
33
Test case \#2
22
62
93

