Code Jam 2011 - World Finals

Runs

Problem

I have a string **S** consisting of lower-case alphabetic characters, 'a' - 'z'. Each maximal sequence of contiguous characters that are the same is called a "run". For example, "bookkeeper" has 7 runs. How many different permutations of **S** have exactly the same number of runs as **S**?

Two permutations `a` and `b` are considered different if there exists some index `i` at which they have a different character: `a[i] ≠ b[i]`.

Input

The first line of the input gives the number of test cases, **T**. **T** lines follow. Each contains a single non-empty string of lower-case alphabetic characters, **S**, the string of interest.

Output

For each test case, output one line containing "Case #x: y", where x is the case number (starting from 1) and y is the number of different permutations of **S** that have exactly the same number of runs as **S**, modulo 1000003.

Limits

1 ≤ **T** ≤ 100.
S is at least 1 character long.
Memory limit: 1GB.

Small dataset (Test set 1 - Visible)

S is at most 100 characters long.
Time limit: 30 seconds.

Large dataset (Test set 2 - Hidden)

S is at most 450000 characters long.
S has at most 100 runs.
The input file will not exceed 1 megabyte in size.
Time limit: 60 seconds.

Sample

Sample Input	Sample Output
2 aabcd bookkeeper	Case #1: 24 Case #2: 7200