Problem C. Cyclic Shifts

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	512 mebibytes

Let $s = s_1 s_2 \dots s_k$ be a string of length k. For any integer i between 0 and $k-1$, inclusive, we define the i-th *cyclic shift* of s as the string $s_{i+1} s_{i+2} \dots s_k s_1 \dots s_i$. For example, the 4-th cyclic shift of "`wellplayed`" is "`playedwell`", while the 0-th cyclic shift of "`metro`" is "`metro`" itself.

Let's define a function $f(s)$ which, for a string of length k, is equal to i such that the i-th cyclic shift of s is the lexicographically smallest among all its cyclic shifts. If there are several such i's, then $f(s)$ is equal to the smallest of them. For example, $f($"`acabbac`"$) = 2$, while $f($"`cabcab`"$) = 1$.

Let's define a function $g(s)$ which, for a string of length n, is equal to the sum of $f(s_1 s_2 ... s_k) \cdot 8753^{k-1}$ over all k between 1 and n, inclusive.

For each given string s, find the value of $g(s)$ modulo $10^9 + 123$.

Input

The first line of the input contains a single integer t ($1 \le t \le 10^4$) — the number of test cases.

Each of the next t lines contains a non-empty string consisting of lowercase English letters.

The total length of the input strings doesn't exceed 10^6.

Output

For each string s in order of input, output a single integer — the value of $g(s)$ modulo $10^9 + 123$.

Example

standard input	standard output
2 aab acabbac	0 38098220

Note

In the first example test case, $f($"`a`"$) = 0$, $f($"`aa`"$) = 0$, and $f($"`aab`"$) = 0$. Therefore, $g($"`aab`"$) = 0$.

Here is the list of values of $f(s_1 s_2 \dots s_k)$ for the second example test case:

- $f($"`a`"$) = 0$;
- $f($"`ac`"$) = 0$;
- $f($"`aca`"$) = 2$;
- $f($"`acab`"$) = 2$;
- $f($"`acabb`"$) = 2$;
- $f($"`acabba`"$) = 5$;
- $f($"`acabbac`"$) = 2$.

Thus, $g($"`acabbac`"$) = 2 \cdot 8753^2 + 2 \cdot 8753^3 + 2 \cdot 8753^4 + 5 \cdot 8753^5 + 2 \cdot 8753^6 = 899695598935764095704157$, which is equal to 38098220 modulo $10^9 + 123$.