

Problem J. Rikka with String

Input file: *standard input*
Output file: *standard output*
Time limit: 6 seconds
Memory limit: 512 mebibytes

This is the last problem of this contest, so Rikka doesn't want to add a lengthy background to it. Let us make all the things simple and clear.

You have a string s of length n which only contains lowercase English letters from “a” to “l” (there are 12 possible letters). You can choose a permutation of these 12 letters p_a, p_b, \dots, p_l , and then consider the string $t = p_{s_1}p_{s_2} \dots p_{s_n}$. Your task is to check for each i from 1 to n whether the i -th suffix (the substring $t[i, n]$) can become the largest suffix of t in lexicographical order after such modification.

Input

The first line contains a single integer t ($1 \leq t \leq 10^3$), the number of test cases.

Each test case is given on a separate line containing a string s ($1 \leq |s| \leq 10^5$, the string contains only lowercase English letters from “a” to “l”).

It is guaranteed that there are at most 15 test cases with $|s| > 10^3$.

Output

For each test case, output a single line with a binary string of length $|s|$. If the i -th suffix can become the largest one, the i -th position must contain “1”. Otherwise, it must contain “0”.

Example

standard input	standard output
3	01100
abaab	11111111111011111111110
abcdefghijklklkjihgfedcba	10101000100000
aabbccbaabcca	