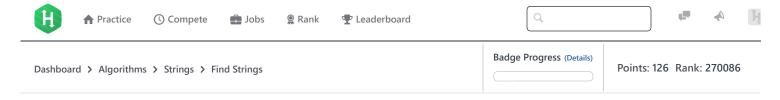
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Find Strings



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You are given n strings w_1 , w_2 ,, w_n . Let S_i denote the set of strings formed by considering all unique substrings of the string w_i . A substring is defined as a contiguous sequence of one or more characters in the string. More information on substrings can be found here. Let $S = \{S_1 \cup S_2 \cup S_n\}$ i.e. S is a set of strings formed by considering all the unique strings in all sets S_1 , S_2 , S_n . You will be given many queries, and for each query, you will be given an integer 'k'. Your task is to display the lexicographically k^{th} smallest string from the set S.

Input Format

The first line of input contains a single integer n, denoting the number of strings. Each of the next n lines consists of a string. The string on the i^{th} line (1 <= i <= n) is denoted by w_i and has a length m_i . The next line consists of a single integer q, denoting the number of queries. Each of the next q lines consists of a single integer k.

Note: The input strings consist only of lowercase english alphabets 'a' - 'z'.

Constraints

1 <= n <= 50 $1 <= m_i <= 2000$ 1 <= q <= 500 1 <= k <= 1000000000

Output Format

Output q lines, where the ith line consists of a string which is the answer to the ith query. If the input is invalid (i.e., k > size of S), display "INVALID" for that case.

Sample Input

aab aac 3

> 8 23

Sample Output

aab c INVALID

Explanation

For the sample test case, we have 2 strings "aab" and "aac".

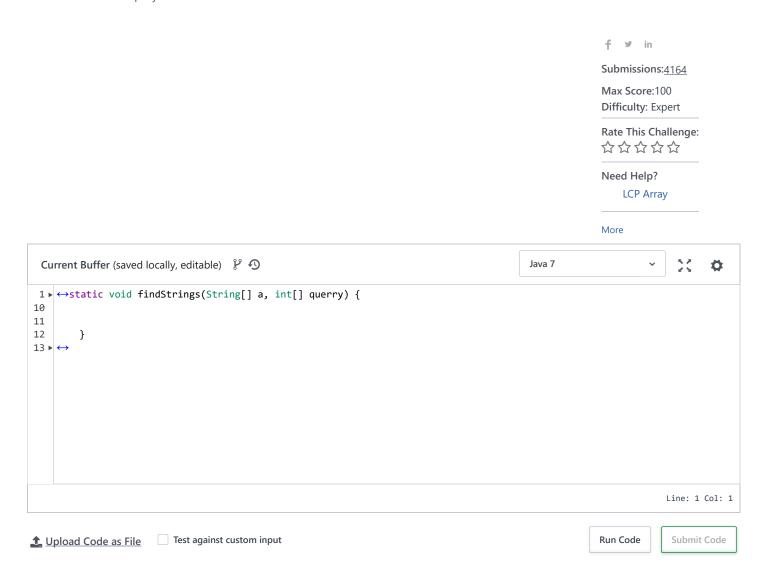
S1 = {"a", "aa", "aab", "ab", "b"}. These are the 5 unique substrings of "aab".

S2 = {"a", "aa", "aac", "ac", "c"}. These are the 5 unique substrings of "aac".

Now, S = {S1 U S2} = {"a", "aa", "aab", "aac", "ab", "ac", "b", "c"}. Totally, 8 unique strings are present in the set S.

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The lexicographically 3rd smallest string in S is "aab" and the lexicographically 8th smallest string in S is "c". Since there are only 8 distinct substrings, the answer to the last query is "INVALID".



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