

Find Strings

A substring is defined as a contiguous sequence of one or more characters in the string. More information on substrings can be found [here](#).

You are given n strings $w[1], w[2], \dots, w[n]$. Let $S[i]$ denote the set of all unique substrings of the string $w[i]$. Let $S = \{S[1] \cup S[2] \cup \dots \cup S[n]\}$, that is, S is a set of strings that is the union of all substrings in all sets $S[1], S[2], \dots, S[n]$. There will be many queries. For each query you will be given an integer ' k '. Your task is to find the k^{th} element of the **1-indexed** lexicographically ordered set of substrings in the set S . If there is no element k , return **INVALID**.

For example, your strings are $w = [abc, cde]$. All of the substrings are $S[1] = \{a, b, c, ab, bc, abc\}$ and $S[2] = \{c, d, e, cd, de, cde\}$. Combine the two sets and sort them to get $S = \{a, ab, abc, b, bc, c, cd, cde, d, de, e\}$. So, for instance if $k = 1$, we return 'a'. If $k = 5$, we return 'bc'. If $k = 20$ though, there is not an $S[20]$ so we return **INVALID**.

Function Description

Complete the *findStrings* function in the editor below. It should return array of strings.

findStrings has the following parameter(s):

- w : an array of strings
- $queries$: an array of integers

Input Format

The first line contains an integer n , the number of strings in the array w .

Each of the next n lines consists of a string $w[i]$.

The next line contains an integer q , the number of queries.

Each of the next q lines consists of a single integer k .

Constraints

$$1 \leq n \leq 50$$

$$1 \leq |w[i]| \leq 2000$$

$$1 \leq q \leq 500$$

$$1 \leq k \leq 10^9$$

Each character of $w[i] \in \text{ascii}[a - z]$

Output Format

Return an array of q strings where the i^{th} string is the answer to the i^{th} query. If a k is invalid, return "INVALID" for that case.

Sample Input

```
2
aab
aac
```

3
3
8
23

Sample Output

aab
c
INVALID

Explanation

For the sample test case, we have 2 strings "aab" and "aac".
 $S_1 = \{ "a", "aa", "aab", "ab", "b" \}$. These are the 5 unique substrings of "aab".
 $S_2 = \{ "a", "aa", "aac", "ac", "c" \}$. These are the 5 unique substrings of "aac".
Now, $S = \{ S_1 \cup S_2 \} = \{ "a", "aa", "aab", "aac", "ab", "ac", "b", "c" \}$. Totally, 8 unique strings are present in the set S .
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".