

New but Nostalgic Problem

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 1024 megabytes

Given n strings w_1, w_2, \dots, w_n , please select k strings among them, so that the lexicographic order of string v is minimized, and output the optimal string v . String v satisfies the following constraint: v is the longest common prefix of two selected strings with different indices. Also, v is the lexicographically largest string among all strings satisfying the constraint.

More formally, let \mathbb{S} be a set of size k , where all the elements in the set are integers between 1 and n (both inclusive) and there are no duplicated elements. Let $\text{lcp}(w_i, w_j)$ be the longest common prefix of string w_i and w_j , please find a set \mathbb{S} to minimize the lexicographic order of the following string v and output the optimal string v .

$$v = \max_{i \in \mathbb{S}, j \in \mathbb{S}, i \neq j} \text{lcp}(w_i, w_j)$$

In the above expression, max is calculated by comparing the lexicographic order of strings.

Recall that:

- String p is a prefix of string s , if we can append some number of characters (including zero characters) at the end of p so that it changes to s . Specifically, empty string is a prefix of any string.
- The longest common prefix of string s and string t is the longest string p such that p is a prefix of both s and t . For example, the longest common prefix of “abcde” and “abcef” is “abc”, while the longest common prefix of “abcde” and “bcdef” is an empty string.
- String s is lexicographically smaller than string t ($s \neq t$), if
 - s is a prefix of t , or
 - $s_{|p|+1} < t_{|p|+1}$, where p is the longest common prefix of s and t , $|p|$ is the length of p , s_i is the i -th character of string s , and t_i is the i -th character of string t .

Specifically, empty string is the string with the smallest lexicographic order.

Input

There are multiple test cases. The first line of the input contains an integer T indicating the number of test cases. For each test case:

The first line contains two integers n and k ($2 \leq n \leq 10^6$, $2 \leq k \leq n$) indicating the total number of strings and the number of strings to be selected.

For the following n lines, the i -th line contains a string w_i ($1 \leq |w_i| \leq 10^6$) consisting of lower-cased English letters.

It's guaranteed that the total length of all strings of all test cases will not exceed 10^6 .

Output

For each test case output one line containing one string indicating the answer. Specifically, if the answer is an empty string, print **EMPTY**.

Example

standard input	standard output
2 5 3 gdcpc gdcpcpcp suasua suas sususua 3 3 a b c	gdcpc EMPTY