Problem G. Version Control System

Input file:	`git-hashes.in`
Output file:	`git-hashes.out`
Time limit:	1 second
Memory limit:	256 mebibytes

In a certain Yandex LLC unit, there are N developers. Each of them has one string pattern which he considers beautiful (a pattern is made of uppercase letters of Latin alphabet). An employee can post his favorite pattern on his personal page if he thinks it is necessary. The patterns of all developers have the same length L.

Nowadays, one of the most popular version control system is Git. A particular source code version (a *commit* in Git terms) is identified by a hash string composed of digits from `0` to `9` and letters from `a` to `f`. We say that a hash matches the given pattern if it contains the same characters on the places where the pattern has the same characters. For example, the hash `1ac1ca1` matches the patterns `ACEAOXA` and `ABCACBP`.

Some day, Peter, the development unit head, wondered how many Git hashes there are that match all the patterns of unit employees. Soon he found the answer. Then he became interested in how many hashes match the patterns of employees working on particular projects. There are Q project teams, each is a subset of the unit's developers. Using a list of members of each team, find the number of hashes that match all the team's patterns at the same time. Print the number for each team in the form $X \cdot 2^Y$ where X is an odd integer (that is, 48 should be printed as $3 \cdot 2^4$).

Input

There are two integers on the first line of input: N and L ($1 \le N, L \le 200$). Next N lines describe N patterns so that line $i+1$ contains i-th employee's favorite pattern. Each pattern has length L and consists of uppercase Latin letters.

The next line contains an integer Q ($1 \le Q \le 200$). Each of the next Q lines contains a string of length N made up with `0`s and `1`s. If the i-th developer ($1 \le i \le N$) works in the team described by the current string, then the i-th character is `1`, otherwise, it is `0`. It is guaranteed that there is at least one `1` on each line.

Output

For each of the Q project teams, output the number of hashes that match the favorite patterns of all the members of the team. Use the form specified above and print X and Y separated by the characters "`*2^`".

Example

git-hashes.in	git-hashes.out
3 7 ABCDCBA XXXTPPP OAOAOAO 2 101 011	1*2^8 1*2^4