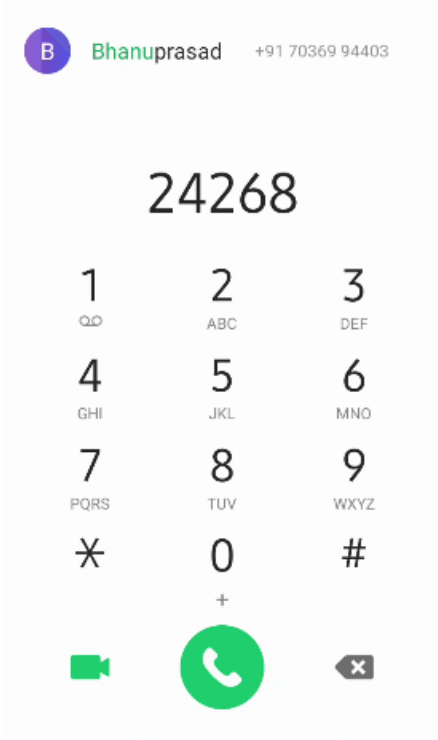
Keypad Trouble

Given n contacts and q queries, output the minimum length of a sequence which, when entered on the phone keypad, will show that contact uniquely.

Let a 'contact' be defined as a tuple of two strings, name and phone number. The phone number of each contact will be exactly 10 digits. The name of a contact will be a string of only lowercase English letters.

The phone keypad looks like this.



From the above image, when you type in the first 2, all contacts whose name starts with a or b or c and all contacts whose mobile number has a substring 2 are filtered.

When you type 24 all contacts whose name starts with a or b or c and whose 2^{nd} character in name is g or h or i and all those contacts whose mobile number has the substring 24 are filtered.

The contacts are filtered and displayed as you type. Benny wants type as few numbers as possible to filter a contact uniquely. Ofcourse, he can always type the persons phone number completely. That would be 10 digits. For each query, print the minimum length of digits Benny has to type to filter that contact uniquely.

Input Format

The first line contains the number of testcases, T

The first line of each testcase contains two integers, n and q.

The next n lines contains two strings, S_i and P_i, name and phone number of each contact.

The next line contains q space-separated strings, from the list of contacts.

Constraints

/

$1 \leq T \leq 500$

$1 \leq n \leq 10^5$

$10 \leq |S_i| \leq 20 \; \forall i$

$|P_i| = 10 \; \forall i$

$1 \leq q \leq n$

$\text{The sum of } n \text{ over all testcases will not exceed } 10^5$

$\text{The phone number does not start with the digit } 0$

Output Format

For each testcase, output the testcase number and q space-separated integers denoting the answers for the queries. Look at the example input for more detials.

Sample Input 0

```
1
3 3
bennyjoseph 8106014898
bhanuprasad 7036994403
vishwanath  9441117750
bennyjoseph bhanuprasad vishwanath
```

Sample Output 0

```
Case #1: 2 1 1
```

Explanation 0

In the first query, typing any one digit will match other contacts as well; typing the digits 98 will uniquely identify bennyjoseph

In the second query, typing only the digit 3 will filter the contact bhanuprasad uniquely as no other phone number has the substring 3 and none of the names start with d or e or f.

In the third query, typing the digit 5 will filter the contact vishwanath uniquely as no other phone number has the substring 5 and none of the names start with j or k or l.

/