Problem J

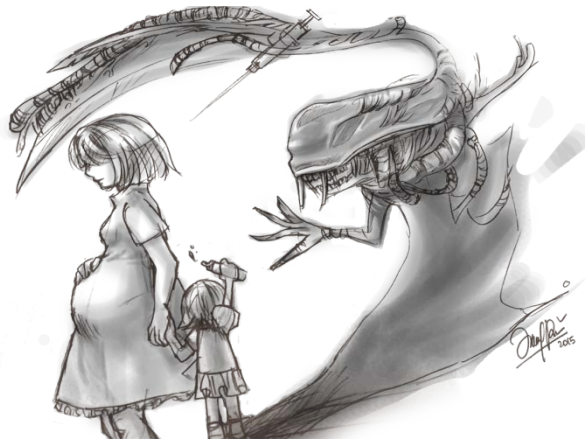
Alien Abduction 3

Three years ago, Earth was surprised by a visit from unknown extra-terrestrial beings (a.k.a. alien). With their ultra-hi-tech ship, they abducted a lot of people and returned them in bizarre locations around the world. To prevent such thing from happening again, we have built a device to disrupt the aliens' ship. We couldn't destroy or capture the ship, but we managed to prevent it from abducting people. At that time, we didn't know what the purpose of those abductions was …until recently. There are many reports about peculiarity on some newborn babies after the abduction happened.

As usual, Earth government consulted the brilliant scientist (again) to make sense of the situation. Upon understanding the grave situation, the brilliant scientist began experimenting on the newborn babies and the parents. In just two days, the brilliant scientist discovered a strange molecule sequence from the babies which cannot possibly be derived from their parents.

A molecule sequence is similar to DNA sequence (DNA is molecule anyway), but instead of composed of only AGTC (adenine-guanine-thymine-cytosine), molecule sequence is a more general sequence composed of from A to Z. In this problem, we don't really care what those alphabets mean. A molecule sequence S can undergo only one mutation with the following procedure:

1. Split S into one or more non-empty substrings S_1, S_2, S_3, …, S_N, where the concatenation of all $S_1 + S_2 + S_3 + \ldots + S_N$ is equal to the original sequence S.
2. Each substring S_i has one chance to substitute itself with another string in the same substitution set where S_i belongs to, whenever possible; this will be explained further in the sample input.
3. Concatenate back all the strings (preserving their order) into a final string.



The brilliant scientist then made a shocking theory. If a mother has a molecule sequence A, while her baby's molecule sequence is B, then it must be possible to mutate (once) both A and B into another sequence C. Otherwise, the baby is an alien! In fact, the brilliant scientist conjectured that this is the insidious reason of the alien abduction: to inject alien's molecules to the abducted mothers so that some of their babies become alien! We're not sure with what the alien's long term goal is, but hopefully it's not taking over the Earth.

The Earth government became furious and instructed the brilliant scientist to build a device to detect which babies are alien, while they're thinking on what to do with those alien babies. The amount of molecule combinations is too much for the brilliant scientist to process by hand. After all these years, the brilliant scientist still haven't learnt to program, and calling you for help ...again.

Input

The first line of input contains an integer T ($T \leq 10$) denoting the number of cases. Each case begins with an integer D ($1 \leq D \leq 5{,}000$) denoting the number of substitution sets. The next D lines each contains an integer E ($1 \leq E \leq 5$) followed by E strings separated by a space, representing one substitution set. No string in the set or across sets are the same. The next line contains an integer M ($M \leq 100$) denoting the number of queries. The next M lines each contains a query of two strings A and B. Each string in the input consists of only uppercase alphabets between 1 and 20 characters, inclusive.

Output

For each case, output "`Case #X:`" (without quotes) in a line where `X` is the case number (starts from 1) followed by M lines. Each line contains a string C denoting the output for each query on the input, preserving the order. String C is the shortest string which can be made by mutating string A and B (independently) once through the procedure mentioned in the problem statement. If there is more than one possible shortest C, then output the smallest lexicographical one. If a query has no valid answer, i.e. string A and B cannot be mutated once into a same string C, then output "`[ALIEN]`" (without quotes) for C for that query.

Sample Input	Output for Sample Input
2 5 3 DF K AB 2 C LM 3 F EF IB 2 G KL 3 HI M H 3 ABCDEF GHIDF ABXDEF GHIDF IBHI FH 6 4 M US CM NUS 4 AC BIN AKA ART 4 VERSI P KA AKAR 5 IB BI UNI JA IC 4 C TY TA SITY 2 JAKA UNIVE 3 ACM IBM ICPC JAKARTA MUS UNIART	Case #1: KLMDF [ALIEN] FH Case #2: BINUS UNIVERSITY [ALIEN]

Explanation for 1st sample case, 1st query

There are 5 substitution sets and the first query is `ABCDEF GHIDF`. Both can be mutated once (independently) to `KLMDF` as follows (note that it is also possible to mutate both strings into `KLMDEF`, but `KLMDF` is shorter):

- `ABCDEF` → `KLMDF`. First, split `ABCDEF` into four substrings: `AB`, `C`, `D`, and `EF`. Substitute `AB` → `K` (we can do this since `AB` and `K` are in the same substitution set), substitute `C` → `LM`, and substitute `EF` → `F`. Finally, concatenate all the strings: `K + LM + D + F` into `KLMDF`. Note that in this example, we choose not to substitute `D`.
- `GHIDF` → `KMLDF`. First, split `GHIDF` into three strings: `G`, `HI`, and `DF`. Substitute `G` → `KL`, and substitute `HI` → `M`. Finally, concatenate the strings: `KL + M + DF` into `KLMDF`.