11870   Antonyms

Little Rushel is preparing for his English test. Part of the test includes matching pairs of words as antonyms or synonyms. A pair of words are called synonyms of each other if both words mean the same thing. For example, "big" and "large" are synonyms. A pair of words are called antonyms of each other if each is the opposite of the other. For example, "big" and "small" are antonyms.

For his test, Rushel needs to memorize a huge list of words. This is really tedious and he would rather spend the time learning to program. So, he comes up with a clever scheme. He notices that if one word is a synonym of another, it is also the antonym of all words that are antonyms of that word. This means that he needs only remember that the words "big" and "large" are synonyms and that "big" and "small" are antonyms, and from that he can infer that "large" and "small" are also antonyms. Thus he does not need to memorize the relationship between all pairs of words, only enough for him to be able to deduce the answer for the rest. Of course, not all words are related (e.g. "big" and "cold"), but the examiner is a sensible person and will not ask meaningless questions like that.

After a little more thought, Rushel observed that for a set of words that are related, the following rules apply:

1. If A and B are synonyms and B and C are synonyms, A and C are synonyms.

2. If A and B are synonyms and B and C are antonyms, A and C are antonyms.

3. If A and B are antonyms and B and C are synonyms, A and C are antonyms.

4. If A and B are antonyms and B and C are antonyms, A and C are synonyms.

Unfortunately for Rushel, his friends pointed out that the rules are too simple for a real human language like English. For example, if fed the data that "ice" and "water" are antonyms, and that "fire" and "water" are also antonyms, it would lead one to infer that "ice" and "fire" are synonyms (by Rule 4), which is obviously wrong. Rushel thinks that this is not really a good example (after all, it doesn't make a lot of sense), but he is still concerned that there might be equally nonsensical relationships in the words that he is learning. He has already prepared lists of synonyms and antonyms to learn, he thinks it will be enough to just check if any of them contain any contradictions.

A set of relationships is said to contain a contradiction if some of the relationships imply or state that a certain pair of words are synonyms while some of the other relationships imply or state that the same pair are antonyms.

Please help Rushel, who is too young to be allowed into this contest, by writing a program that takes as its input sets of pairs of synonyms and antonyms and verifies that there are no contradictions in them.

Input

The first line of the input will containa single integer T all by itself, $T \leq 100$. T test cases follow.

Each test case starts with two numbers N and M ($1 \leq N, M \leq 1000$). N lines follow, each containing a pair of words separated by one or more spaces. Then another M lines follow, also containing pairs of words separated by one or more spaces. Words will be made up of lowercase English characters only ('a' to 'z'), and will never be more than 20 characters long. The first set (the first N pairs) is the set of synonyms and the second set (the latter M pairs) is the set of antonyms.

Output

For each case output one line of the form 'Case X: Y', where X is the test case (starting from 1) and Y is either 'YES' (if the test case contains no contradictions) or 'NO' (if the input contains contradictions).

Sample Input

```
3
2 2
big large
small tiny
big small
tiny huge
2 1
xyz abc
abc def
def xyz
1 3
fire flame
fire ice
ice water
water fire
```

Sample Output

```
Case 1: YES
Case 2: NO
Case 3: NO
```