Problem L. Liar, Liar!

Input file:	`stdin`
Output file:	`stdout`
Time limit:	3 seconds
Memory limit:	512 megabytes

You and your friends have very boring Sociology studies. To make it even worse, your lecturer sometimes invites some famous science freak or even a politician. You became so tired of this non-stopping flood of lies and wrong logic that you have finally invented a funny game named "Liar, Liar!".

You are preparing a list of examples from real life in advance. Each of them consists of a set of properties. For each of those properties, it is known whether it is true or false in this particular example.

An example is said to show a contradiction in a speech if there is a set of implications from speech that subsequently implies a false example property from a true example property.

When some example contradicts with the speech of "another extraordinary professor" for the first time, you stand up and shout "Liar, liar!" telling the number of that example.

You want to prepare well for the upcoming lecture. You have found a video of the previous lecture of this man (which was exactly the same) and have prepared a list of examples. Now you want to compute in advance when you should stand up and shout.

The lecture consists of the number of implications "property A implies property B", but science freaks (and of course politicians) are very sneaky people and they never imply one property twice from other properties to make their lies harder to find. So, no two distinct statements of the forms "A implies B" and "C implies B" for any (not necessarily distinct) properties A, B and C can ever be found in one speech.

Input

The first line of input contains an integer M: the number of statements in the speech ($0 < M \le 500\,000$). The next M lines contain descriptions of implications in the order of their appearance in the speech, one implication per line. Each implication is represented by two integers a_i and b_i ($a_i \ne b_i$, $0 < a_i, b_i \le 500\,000$). This means that property a_i implies property b_i. All b_i are distinct.

The next line there contains an integer Q: the number of prepared examples ($1 \le Q \le 500\,000$). The following Q lines contain descriptions of these examples, one per line. The first number in each such description, t_i, is the number of properties which are true for the given example. Then t_i integers are given: the numbers of these properties. After that comes f_i, the number of properties which are false for the given example, and then f_i integers: the numbers of these properties. All numbers of properties on any single line are pairwise distinct, greater than 0 and do not exceed 500 000. Additionally, it is guaranteed that, for each line i, $t_i + f_i > 0$. The sum of all t_i and f_i over all i does not exceed 500 000.

Output

Output Q lines: for each example, output the number of the first statement of speech after which the example becomes self-contradictory. The statements of the speech are numbered from 1. If an example does not become self-contradictory after all M statements of the speech, output -1 for that example.

Examples

stdin	stdout
6 1 2 2 5 5 7 5 6 2 3 2 4 3 2 1 5 2 3 7 1 2 1 6 1 6 1 2	3 4 -1
5 1 2 2 3 3 4 4 5 5 1 6 1 2 1 4 1 4 1 2 1 2 1 3 1 3 1 2 1 1 1 5 1 5 1 1	3 5 2 5 4 5