

F: Antisocial network

Memory limit: 128 MB

Johnny is the creator of the first ever social network, but hardly anyone knows about it. This is because while he was busy trying to find that one bug in his code, his colleague working on the project shabbily took over the company and fired Johnny. Johnny decided to take revenge by using the bug which he didn't manage to fix: he can *flip* some subsets X of users. Flipping X changes the friendship relation for all pairs of users in X , that is if a and b ($a, b \in X$) were friends, then after flipping they no longer are, and vice versa. Johnny thinks that users who lose all their friends, once all flips are done, will delete their accounts, and that if many do so, the stolen project will surely die. Johnny spent the whole night looking for a good sequence of flips, and eventually came up with a sequence of subsets of users V_1, V_2, \dots, V_k . Before he finally went to sleep he was sure that the sequence he found will make all users delete their accounts, but this morning he is no longer so sure. He may have made a mistake, given his sleep deprivation, anger at the colleague, and questionable programming skills. That's why you should verify for each user if after the flips suggested by Johnny the user would have no friends.

Input

The first input line contains three integers n , m , and k ($1 \leq n \leq 2.5 \cdot 10^5$, $1 \leq k \leq 10^4$, $0 \leq m \leq \min\left\{\frac{n(n-1)}{2}, 2 \cdot 10^6\right\}$), separated by single spaces. These denote, respectively: the number of users of the social network, the number of friend pairs in the network, and the length of sequence of operations suggested by Johnny.

In the next m lines there are pairs of integers a_i, b_i that specify the identifiers of users that are friends ($1 \leq a_i, b_i \leq n$, $a_i \neq b_i$); these numbers are separated by a single space. The (unordered) pairs of friends are distinct.

The next k lines describe the sets V_i . Each of those lines contains sequence of integers $s_i, v_{i_1}, \dots, v_{i_{s_i}}$, separated by single spaces, where s_i ($1 \leq s_i \leq n$) is the size of V_i and v_{i_j} are the elements.

The sum of s_i is not larger than 10^6 .

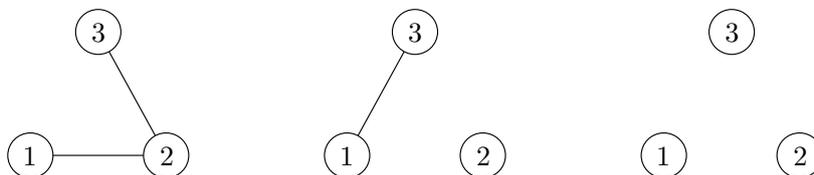
Output

The output should contain n lines: i^{th} line should contain the word **TAK** if after the sequence of flips proposed by Johnny the i^{th} user will have no friends, and **NIE** otherwise.

Example

Input	Output
3 2 2	TAK
1 2	TAK
2 3	TAK
3 1 2 3	
2 1 3	

The diagram showing the friendship relation initially and after each operation:



Input	Output
4 3 4 1 2 2 3 1 3 3 1 2 3 3 2 3 4 2 2 3 2 3 4	TAK NIE TAK NIE

The diagram showing the friends relation in the beginning and after each operation:

