6895 Deduction

Mr. Hong, a private detective, has been summarizing information about the murder cases that he is currently responsible for. Collecting the conduct information of the persons associated with the incident, he was able to construct n statements S_1, S_2, ..., S_n. Mr. Hong does not know whether or not each statement is true. Therefore, he called each statement an incident variable. The following six statements show an example of incident variables.

S_1 : Cheolsu Kim has a dog.

S_2 : Sucheol Park likes cats.

S_3 : Heeyoung Ahn likes Sucheol Park.

S_4 : (*omitted*)

S_5 : (*omitted*)

S_6 : (*omitted*)

Investigating the truth of each incident variable and the relationship between variables, he has constructed his deduction based on the result. His deduction consists of one or more assertions which belong to one of the following three types. The first type is that an incident variable S_i is true, the second type is that a set with one or more incident variables has at least one which is false. The last type is that an incident variable S_i proves to be true if one or more variables associated with S_i are all true. These types are represented as follows.

Type 1: S_i (S_i is true.)
Type 2: $S_{i_1}, S_{i_2}, ..., S_{i_k} \to \varnothing$ (At least one among S_{i_1}, S_{i_2}, ..., and S_{i_k} is false.)
Type 3: $S_{j_1}, S_{j_2}, ..., S_{j_k} \to S_i$ (If S_{j_1}, S_{j_2}, ..., and S_{j_k} are all true, then S_i is also true.).

For example, let's assume that Mr.Hong's deduction consists of the following eight assertions:

① S_1

② S_2

③ $S_1, S_2, S_6 \to \varnothing$

④ $S_1 \to S_6$

⑤ $S_2 \to S_6$

⑥ $S_1, S_6 \to S_3$

⑦ $S_2, S_4 \to S_1$

⑧ $S_5, S_6 \to S_2$

The assertions ① and ② belong to Type 1, the assertion ③ belongs to Type 2, and the assertions ④, ⑤, ⑥, ⑦, ⑧ belong to Type 3. In order to prove that his deduction is valid, he should show that there aren't any contradictions between the assertions of the deduction and that there are no assertions that belong to Type 3 such that the variable on the right side of '→' must be false even though all variables on the left side are all true. (Notice that if there exists a variable on the left side of '→' which is false, the truth of the variable on the right side does not infringe the validity of the deduction.)

A valid assignment means a truth assignment to the incident variables that makes a deduction valid. Mr. Hong wants to know if there is a valid assignment that makes his deduction valid.

In the above example, since both of S_1 and S_2 are true by assertions ① and ②, S_6 must be false by assertion ③. However this leads to a contradiction because S_6 should be true by assertion ⑤. Hence, Mr. Hong's deduction is not valid. If the assertion③ is excluded from his deduction, there exists a valid assignment, which is that all variables are assigned as true or that only S_4 is assigned as false.

Given Mr. Hong's deduction with n incident variables, write a program that determines whether or not there is a valid assignment.

Input

Your program is to read from standard input. The input consists of T test cases. The number of test cases T is given in the first line of the input. Each test case starts with a line containing four integers n, m_1, m_2, m_3 ($1 \leq n \leq 1,500$, $1 \leq m_1 < n$, $0 \leq m_2, m_3 \leq 1,500$), where n is the number of incident variables and m_1, m_2, m_3 are the numbers of Type 1, Type 2, and Type 3 assertions of Mr. Hong's deduction, respectively. Each of the following m_1 lines contains an integer i ($1 \leq i \leq n$) representing a Type 1 assertion, i.e., an incident variable S_1. Each of the following m_2 lines contains $k + 1$ integers k, i_1, i_2, …, and i_k ($1 \leq k, i_1, i_2, \ldots, i_k \leq n$, $i_r \neq i_s$ for $r \neq s$) representing a Type 2 assertion "$S_{i_1}, S_{i_2}, \ldots, S_{i_k} \rightarrow \varnothing$". Each of the following m_3 lines contains $k + 2$ integers k, j_1, j_2, …, j_k, and i ($1 \leq k \leq n - 1$, $1 \leq j_1, j_2, \ldots, j_k, i \leq n$, $j_r \neq j_s$ for $r \neq s$, $i \neq j_r$) for $1 \leq r \leq k$) representing a Type 3 assertion "$S_{j_1}, S_{j_2}, \ldots, S_{j_k} \rightarrow S_i$".

Output

Your program is to write to standard output. Print exactly one line for each test case. The line should contain 'YES' if the deduction is valid, otherwise, 'NO'.

The following shows sample input and output for two test cases.

Sample Input

```
2
6 2 1 5
1
2
3 1 2 6
1 1 6
1 2 6
2 1 6 3
2 2 4 1
2 5 6 2
6 2 0 5
1
2
1 1 6
1 2 6
2 1 6 3
```

```
2 2 4 1
2 5 6 2
```

Sample Output

```
NO
YES
```