



## 2818 - The Geodetic Set Problem

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Let  $G = (V, E)$  be a connected graph without loops and multiple edges, where  $V$  and  $E$  are the vertex and edge, respectively, sets of  $G$ . For any two vertices  $u, v \in V$ , the *distance* between vertices  $u$  and  $v$  in  $G$  is the

number of edges in a shortest  $u - v$  path. A shortest path between  $u$  and  $v$  is called a  $u - v$  geodesic. Let  $I(u, v)$  denote the set of vertices such that a vertex is in  $I(u, v)$  if and only if it is in some  $u - v$  geodesic of  $G$  and, for a set  $S \subseteq V$ ,  $I(S) = \bigcup_{u,v \in S} I(u, v)$ . A vertex set  $D$  in graph  $G$  is called a geodetic set if  $I(D) = V$ . The *geodetic*

*set problem* is to verify whether  $D$  is a geodetic set or not. We use Figure 3 as an example. In Figure 3,  $I(2, 5) = \{2, 3, 4, 5\}$  since there are two shortest paths between vertices 2 and 5. We can see that vertices 3 and 4 are lying on one of these two shortest paths respectively. However,  $I(2, 5)$  is not a geodetic set since  $I(2, 5) \neq V$ .

Vertex set  $\{1, 2, 3, 4, 5\}$  is intuitively a geodetic set of  $G$ . Vertex set  $D = \{1, 2, 5\}$  is also a geodetic set of  $G$  since vertex 3 (respectively, vertex 4) is in the shortest path between vertices 1 and 5 (respectively, vertices 2 and 5). Thus,  $I(D) = V$ . Besides, vertex sets  $\{1, 3, 4\}$  and  $\{1, 4, 5\}$  are also geodetic sets. However,  $D = \{3, 4, 5\}$  is not a geodetic set since vertex 1 is not in  $I(D)$ .

### Input

The input file consists of a given graph and several test cases. The first line contains an integer  $n$  indicating the number of vertices in the given graph, where  $2 \leq n \leq 40$ . The vertices of a graph are labeled from 1 to  $n$ .

Each vertex has a distinct label. The following  $n$  lines represent the adjacent vertices of vertex  $i$ ,  $i = 1, 2, \dots, n$ . For example, the second line of the sample input indicates that vertex 1 is adjacent with vertices 2 and 3. Note that any two integers in each line are separated by at least one space. After these  $n$  lines, there is a line which contains the number of test cases. Each test case is shown in one line and represents a given subset  $D$  of vertices. You have to determine whether  $D$  is a geodetic set or not.

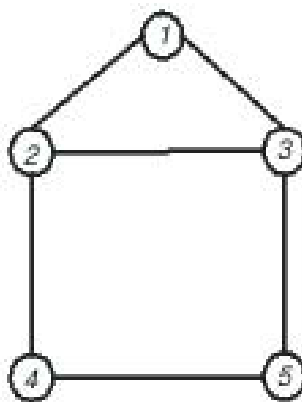


Figure 3: A graph  $G$ .

### Output

For each test case, output 'yes' in one line if it is a geodetic set or 'no' otherwise.

## Sample Input

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

## Sample Output

```
yes
yes
no
yes
yes
no
```

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