IOI Training Camp 2018 Final Test 2

Exact Walks

Maui had an undirected connected graph $G = (V, E)$, where $V = \{v_1, v_2, \ldots v_N\}$ and E is the edge set. He also had a list of positive non-zero integers $a_1, a_2, \ldots, a_N$. He was bored of his usual adventures and decided to build a new directed graph $G' = (U, F)$. $U = \{u_1, u_2, \ldots u_N\}$ and $(u_i, u_j) \in F$ if and only if there is a walk of length exactly a_i from v_i to v_j in G. Note that this walk could repeat edges. He then noticed that the new directed graph G' had two vertices u_i and u_j, such that there was no path from u_i to u_j in G'. Note that there could be more such pairs of vertices.

But now, Maui has lost his list of integers, and has only the graph G. Help him by constructing any list which would satisfy the property mentioned, or state that it cannot be done.

Input

The first line of the input contains two integers: N, M, which represent the number of nodes and edges in G respectively.
The i-th of the next M lines contains two numbers i and j, which signify that the undirected edge (v_i, v_j) exists in G.

Output

If a list of integers which satisfies the property exists, print "YES" in the first line and the N integers in order in the second line. Each of the integers must satisfy $1 \leq a_i \leq 10^9$.
If it does not exist, print "NO".

General Constraints

Unless otherwise mentioned, the following constraints are met throughout all subtasks:

- $2 \leq N \leq 100$
- $1 \leq M \leq N * (N-1)/2$
- $1 \leq i, j \leq N$
- The input graph will be connected.
- There will be no multi-edges or self-loops.

Subtasks

Subtask 1 (19 Points):

- $2 \leq N \leq 15$

Subtask 2 (5 Points):

- The input graph will be bi-partite.

Subtask 3 (76 Points):

- No further constraints.

Sample Input 1

```
3 2
1 2
2 3
```

Sample Output 1

```
YES
2 1 2
```

Explanation

In our output, $a_1 = 2$, and so there will be a direct edge from u_1 to u_2 if and only if there is a walk of length 2 between v_1 and v_2. But there isn't any such walk. But there is a walk of length 2 between v_1 and v_3, and so there is a direct edge from u_1 to u_3 in G'. Similarly you can check that the edge set of G' is $\{(u_1, u_3), (u_3, u_1), (u_2, u_1), (u_2, u_3)\}$. Now notice that there is no path from u_1 to u_2 in G'. Hence this is a valid output.

Limits

Time: 2 seconds

Memory: 128 MB