

775 Hamiltonian Cycle

A few definitions first:

Definition 1 A graph $G = (V, E)$ is called “dense” if for each pair of non-adjacent vertices u and v , $d(u) + d(v) \geq n$ where $n = |V|$ and $d(\bullet)$ denotes the degree of the vertex \bullet .

Definition 2 A “Hamiltonian cycle” on G is a sequence of vertices $(v_{i_1} v_{i_2} \dots v_{i_n} v_{i_1})$ such that $v_{i_l} \neq v_{i_h}$ for all $l \neq h$ and $\{v_{i_l}, v_{i_l}\}$ is an edge of G .

The problem is: write a program that, given a dense graph $G = (V; E)$ as input, determines whether G admits a Hamiltonian cycle on G and outputs that cycle, if there is one, or outputs “N” if there is none.

Input

A file containing descriptions of graphs, each one ending with a %, in the form:

```
n1
ui1 uj1
ui2 uj2
...
%
n2
ui1 uj1
ui2 uj2
...
%
```

where n_i is the number of vertices and $u_{i_h} u_{i_l}$ are integers between 1 and n indicating that there exists an edge between vertex u_{i_h} and u_{i_l}

Output

The output file must contain the sequence of vertices that form a Hamiltonian cycle in the form:

```
ui1 ui2 ui3 ...
or containing:
N
```

Sample Input

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

Sample Output

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