IOITC 2019
Team Selection Test 2

Check SCC v2.0

The jury has a hidden directed graph G. It has N nodes which are numbered from 1 to N. Your job is to figure out whether it is strongly connected [1]. You can ask queries of the following type:

- Give two disjoint subsets A and B of the vertex set. The jury will tell you whether there is at least one edge going from a vertex of A to a vertex of B in G.

Interaction Protocol

You can ask at most Q queries of the kind described above (see subtasks section for value of Q). To interact with the jury, you have two options:

Use the supplied `contestant.cpp` file

You have to implement the function `solve`. To ask questions, call the function `query` with two `std::vector` arguments – A and B respectively. The call will return `True` if there is an edge from A to B, and `False` otherwise. If you exceed the query limit, the call will terminate your program gracefully.

When you think you have the answer, return from `solve` with `True` if you believe G is strongly connected, and `False` otherwise.

Directly interact with `stdin/stdout`

You should read N, the number of vertices in G.

To ask a query, print the alphabet `Q`. Then in the next line print the size of A, followed by the elements of A in another line. Then do the same for B. After printing your query please flush the output with either `std::cout << std::flush;`, `std::cout << std::endl`, or `fflush(stdout);`.

The jury will respond with 1 if there is an edge from A to B, 0 if there isn't, or -1 if something is wrong ie.

- You asked too many queries.
- Your query doesn't follow the format described above.

In either case, your program should terminate gracefully to receive a useful `WA` verdict.
This response of the jury should be inputted from stdin (eg. using cin).

To print the final answer, print the letter `A` followed by a space, and then `YES` if you believe G is strongly connected, and `NO` otherwise. This does not count towards the query limit. After you print this, please terminate gracefully.

Constraints

- $2 \leq N \leq 128$
- G does not have self-loops, but it may have anti-parallel edges (ie. (u, v) and (v, u) might both be edges of G).

[1] A directed graph G is strongly connected if for every pair of vertices u and v there exists a path from u to v and there exists a path from v to u

Subtasks

(Q denotes the query-limit)

- Subtask 1: 6%: $N \leq 64$ and $Q = 4200$.
- Subtask 2: 43%: $Q = 3600$.
- Subtask 3: 22%: $Q = 2019$.
- Subtask 4: 29%: $Q = 1800$.

Sample

(Note that the dotted lines are for clarity, and will not exist in actual interaction)

```
6
---------------------------------
---------------------------------
---------------------------------
---------------------------------
---------------------------------
1
---------------------------------
---------------------------------
---------------------------------
---------------------------------
---------------------------------
0
```

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

Q
4
1 2 3 6
2
4 5

A NO
```

Explanation

The digraph corresponding to the interaction above: