E - Reachability Query   Editorial (/contests/abc420/tasks/abc420_e/editorial)

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Time Limit: 3 sec / Memory Limit: 1024 MiB

Score : 450 points

Problem Statement

You are given an undirected graph with N vertices and zero edges.

The vertices are numbered $1, 2, \ldots, N$, and initially all vertices are white.

Process a total of Q queries of the following three types:

- Type 1 : Add an undirected edge connecting vertices u and v.
- Type 2 : If vertex v is white, change it to black; if it is black, change it to white.
- Type 3 : Determine whether a black vertex can be reached from vertex v by traversing zero or more edges; report Yes if reachable, and No otherwise.

Constraints

- All input values are integers.
- $1 \le N \le 2 \times 10^5$
- $1 \le Q \le 6 \times 10^5$
- Type 1 queries satisfy the following constraints:
    - $1 \le u < v \le N$
    - For each query, no edge connecting u and v has been added before that query.
- Type $2, 3$ queries satisfy the following constraints:
    - $1 \le v \le N$

Input

The input is given from Standard Input in the following format:

```
N  Q
Query_1
Query_2
⋮
Query_Q
```

where Query_i represents the i-th query.

Type 1 queries are given in the following format:

```
1  u  v
```

Type 2 queries are given in the following format:

```
2  v
```

Type 3 queries are given in the following format:

```
3  v
```

Output

For each type 3 query, output the answer as follows:

- Yes if a black vertex can be reached from vertex v by traversing zero or more edges;
- No if no black vertex can be reached from vertex v by traversing zero or more edges.

Sample Input 1   Copy

```
5  12
3 2
2 2
3 2
1 2 5
1 3 4
3 4
3 5
1 4 5
1 1 3
3 1
2 2
3 1
```

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Sample Output 1   Copy

```
No
Yes
No
Yes
Yes
No
```
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In this input, the graph initially has five vertices and zero edges.

This input contains 12 queries.

- The 1st query is `3` `2`.
  - At this point, no black vertex can be reached from vertex 2 by traversing zero or more edges, so report `No`.
- The 2nd query is `2` `2`.
  - Vertex 2 is white, so change it to black.
- The 3rd query is `3` `2`.
  - At this point, black vertex 2 can be reached from vertex 2 by traversing zero or more edges. Therefore, report `Yes`.
- The 4th query is `1` `2` `5`.
  - Add an edge connecting vertices $2, 5$.
- The 5th query is `1` `3` `4`.
  - Add an edge connecting vertices $3, 4$.
- The 6th query is `3` `4`.
  - At this point, no black vertex can be reached from vertex 4 by traversing zero or more edges, so report `No`.
- The 7th query is `3` `5`.
  - At this point, black vertex 2 can be reached from vertex 5 by traversing zero or more edges. Therefore, report `Yes`.
- The 8th query is `1` `4` `5`.
  - Add an edge connecting vertices $4, 5$.
- The 9th query is `1` `1` `3`.
  - Add an edge connecting vertices $1, 3$.
- The 10th query is `3` `1`.
  - At this point, black vertex 2 can be reached from vertex 1 by traversing zero or more edges. Therefore, report `Yes`.
- The 11th query is `2` `2`.
  - Vertex 2 is black, so change it to white.
- The 12th query is `3` `1`.
  - At this point, no black vertex can be reached from vertex 1 by traversing zero or more edges, so report `No`.

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