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E - Reachability Query

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

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Input

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

```
 $N$   $Q$   
Query1  
Query2  
⋮  
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

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```
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

Copy

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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