



# DAGestan

The Hasbulla is a popular dwarf guy from Dagestan, Russia. He decided to stop fighting with Abdurrozik and started engaging with competitive programming. He likes graph problems, especially graphs without cycles. While solving some graph problems at this home at Makhachkala, he encountered an interesting problem related to directed graph with some queries. Unfortunately, he could not solve the problem himself and decided to ask for your help. The problem looks like this:

You are given an  $n$  vertices  $m$  edges **DAG** (Directed Acyclic Graph)  $G$ . Each vertex  $x$  has a non-negative integer value  $a_x$ , where initially  $a_x = 0$  for all vertices of  $G$ .

Hasbulla wants you to perform  $q$  operations of three types described below:

- 1. Given  $x$  and  $val$ , set  $a_y$  to  $val$  for all  $y$  reachable from  $x$ .
- 2. Given  $x$  and  $val$ , set  $a_y$  to  $\min\{a_y, val\}$  for all  $y$  reachable from  $x$ .
- 3. Given  $x$ , print its current value of  $a_x$

A vertex  $v$  is said to be reachable from the vertex  $u$  if there is a path starting in  $u$  and ending in  $v$ . A *path* is a vertex sequence  $p_1, p_2, \dots, p_k$  satisfying  $(p_i, p_{i+1}) \in G$  for each  $i = 1, 2, \dots, k - 1$ .

## Input Format

The first line of input contains three integers  $n, m, q$  - the number of vertices and edges in graph  $G$ , then following the number of queries

Then  $m$  lines follow. Each of them contains two integers  $u_i$  and  $v_i$ , representing a directed edge in the graph  $G$ .

Then  $q$  lines follow. Each of them contains two or three integers in one of the following three formats:

- " $1\ x\ val$ " indicating the first type of operation.
- " $2\ x\ val$ " indicating the second type of operation.
- " $3\ x$ " indicating the third type of operation.

All parameters in the operations above satisfy  $1 \leq x \leq n$  and  $0 \leq val \leq 10^9$ .

## Constraints

$$1 \leq n, m, q \leq 10^5$$

$$1 \leq u_i, v_i \leq n$$

The input graph is guaranteed to be a DAG.

## Output Format

For each operation of the third type, print a single line containing an integer: the current value of  $a_u$ .

## Sample Input:

Copy

Submit Solution

✓ **Points:** 1

⌚ **Time limit:** 6.0s

Java 8: 10.0s

Python: 12.0s

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```
4 4 7
1 2
1 3
3 4
2 4
1 1 5
1 2 1
3 3
3 4
2 1 3
3 2
3 3
```

Sample Output:

```
5
1
1
3
```

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