

# Graph

## Problem ID: graph

### Time limit: 1 second

You are given a graph containing  $n$  vertices and  $m$  directed arcs. Vertices are numbered from 1 to  $n$ , inclusive; and arcs are numbered from 1 to  $m$ , inclusive. The  $i$ -th arc starts from the  $s_i$ -th vertex, ends at the  $t_i$ -th vertex and has a cost of  $c_i$ .

In this problem, a **valid path** is a sequence of arcs in which the first one starts at the 1-st vertex, the last one ends at the  $n$ -th vertex and every arc ends at the starting vertex of the next one. More formally, a valid path can be represented by a sequence of indices  $(e_1, e_2, \dots, e_k)$  satisfying all below conditions:

- $1 \leq e_1, e_2, \dots, e_k \leq m$
- $s_{e_1} = 1$
- $s_{e_k} = n$
- $t_{e_j} = s_{e_{j+1}}$  for all  $j$  such that  $0 < j < k$

Please note that these indices do not need to be distinct, meaning that a valid path may walk through some edge multiple times.

Your task is to mark some (possibly none or all) arcs of the given graph special so as to fulfill this requirements: Every valid path of this graph passes through special arcs **exactly once**. In other words, if the sequence of indices  $(f_1, f_2, \dots, f_k)$  represents a valid path, there should be exactly one index  $l$  such that  $1 \leq l \leq k$  and the  $f_l$ -th arc is marked special. Moreover, the total cost of special arcs should be as small as possible.

## Input

The input contains multiple test cases. Each test case is presented as below:

- The first line contains two integers  $n$  and  $m$  ( $2 \leq n \leq 100$ ,  $1 \leq m \leq 2500$ ) denoting the number of vertices and arcs of the graph, respectively.
- In the next  $m$  lines, each contains three integers  $s_i$ ,  $t_i$  and  $c_i$  ( $1 \leq s_i, t_i \leq n$ ,  $1 \leq c_i \leq 10^9$ ) denoting the starting and ending vertices of the  $i$ -th arc and its cost, respectively.
- The last line is a blank line.

The input is terminated by two zeros which do not represent a test case. It is guaranteed that:

- For every arc, its starting vertex differs from its ending one.
- For every graph, each ordered pair  $(s_i, t_i)$  appears at most once.
- A valid path always exists.

The sum of  $n$  over all test cases does not exceed 1000. The sum of  $m$  over all test cases does not exceed 25000.

## Output

Write the result of each test case in a single line: If it is impossible to mark arcs in order to satisfy the above requirements, print “IMPOSSIBLE” (without quotes). Otherwise, print the minimum possible total cost of special arcs.

## Explanation

In the first test case, there are three valid paths, whose arc indices are  $(4, 3)$ ,  $(1, 5)$  and  $(1, 2, 3)$ . The optimal solution is to mark the first and the forth arcs special. Note that marking the first and the third arcs is not a valid way, since the valid path  $(1, 2, 3)$  will pass through special arcs twice.

In the second test case, please be aware that a valid path can contain duplicated arcs. Hence, (2, 1, 2) or even (2, 1, 2, 1, 2) are valid paths of this graph. Consequently, marking the second arc is not possible, as it appears more than once in those valid paths. As a result, solution does not exist.

**Sample Input 1**

```
4 5
1 2 1
2 3 1
3 4 1
1 3 8
2 4 8
```

```
2 2
2 1 1
1 2 1
```

```
0 0
```

**Sample Output 1**

```
9
IMPOSSIBLE
```