



Hello, 2024101067.

Not more than 3

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admin➤ **Problem type**▼ **Allowed languages**
C, C++

Problem Statement

You are given an **undirected** graph with n vertices and m edges. The vertices are numbered from 1 to n , and for each i ($1 \leq i \leq m$) the i^{th} edge is between vertex u_i and v_i and has a length w_i .

Your task is to find the lengths of the **shortest paths** from vertex 1 to *all* the vertices. However, there is a catch. In any path that is taken to reach any vertex from 1, the **number of consecutive even or odd vertices encountered cannot exceed 3**. If it is not possible to reach a particular vertex under this constraint, output -1 for that vertex.

Input Format

The first line of input contains two integers n and m denoting the number of vertices and edges respectively.

Each of the next m lines contains three integers u_i , v_i and w_i representing an edge between these two vertices and the length of the edge.

Constraints

$$1 \leq n \leq 100,000$$

$$1 \leq m \leq 200,000$$

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

$$1 \leq w_i \leq 1,000,000,000$$



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Print n integers, the lengths of the **shortest paths** to all vertices from vertex 1, following the condition mentioned above.

Sample Test Case 0:

Input:

```
7 8
1 3 2
2 4 3
3 2 10
3 5 3
2 4 4
5 7 1
7 6 1
4 6 1
```

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Output:

```
0 12 2 15 5 16 17
```

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Explanation:

Main observation is that to get to vertex 7, while normally shortest length would be 6, this time we will have to take the path 1 -> 3 -> 2 -> 4 -> 6 -> 7, which gives length as 17. The other lengths can also be checked similarly.

Graph Preview:

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```
1 - 3 - 5 - 7
    |       |
    2 = 4 - 6
```

Sample Test Case 1:

Input:

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```
0 ,
1 3 2
3 2 10
3 5 3
5 7 1
2 4 2
4 6 2
6 8 1
```

Output:

```
0 12 2 14 5 16 26 -1
```

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Explanation:

In order to get to vertex 7, while normally shortest length would be 6, this time we will have to take the path 1 -> 3 -> 2 -> 3 -> 5 -> 7, which gives length as 26. The other lengths can also be checked similarly. Note, that it is impossible to reach vertex 8 as the only path to it already has three even numbers.

Graph Preview

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```
1 - 3 - 2 - 4 - 6 - 8
  |
  5
  |
  7
```

Sample Test Case 2:

Input:

```
4 1
1 2 3
```

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Output:

```
0 3 -1 -1
```

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It is impossible to reach vertices 3 and 4 as they are disconnected.

Sample Test Case 3:

Input:

```
3 4
1 2 6
1 3 2
3 2 3
1 3 4
```

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Output:

```
0 5 2
```

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Clarifications

[Request clarification](#)

No clarifications have been made at this time.