

Problem C. エガクミライ

Time limit 1000 ms

Memory limit 256MB

Problem Description

MyGO!!!! has a brand-new single “エガクミライ” and needs to travel from RiNG to Isshiki Coast to shoot the MV.

The city’s traffic can be modeled as a graph with n crossroads and m bidirectional roads. RiNG is at the crossroad 1, and Isshiki Coast is at the crossroad n .

Each road i is associated with four values: u_i, v_i, w_i and t_i . Road i connect crossroad u_i and v_i . The value w_i is the time needed to traverse road i . The city operates in discrete time with a maintenance period of length k . At any moment when the current time modulo k equals t_i , road i is closed. You may wait at any crossroad for any non-negative amount of time.

If you start traversing road i at time t , you will occupy the road during the integer times $t, t + 1, \dots, t + w_i - 1$. If any moment in this set satisfies $x \bmod k = t_i$, you cannot depart at time t . You must wait longer and try again later. If $t_i = -1$, road i is never under maintenance and may be traverse at any time.

Anon, the member of MyGO!!!!, wants to know the minimum number of time units required to travel from crossroad 1 (RiNG) to crossroad n (Isshiki Coast). Compute this minimum arrival time, or output -1 if it is impossible to reach crossroad n .

Input format

The first line contains three integer n, m, k ($2 \leq n \leq 2 \cdot 10^5$, $n - 1 \leq m \leq 2 \cdot 10^5$, $1 \leq k \leq 10^9$) — the number of crossroads, roads, and the length of maintenance period.

Each of the next m lines contains four integers u_i, v_i, w_i, t_i ($1 \leq u_i, v_i \leq n$, $u_i \neq v_i$, $1 \leq w_i \leq 10^9$, $-1 \leq t_i < k$) — the values associate with road i .

It is guaranteed that the given graph is connected.

Output format

Output one integer — the minimum arrival time from crossroad 1 to crossroad n . If it is impossible to reach crossroad n , output -1 .

Subtask score

| Subtask | Score | Additional Constraints |
|---------|-------|------------------------|
| 1 | 12 | $n, m, k \leq 500$ |
| 2 | 19 | $m = n - 1$ |
| 3 | 31 | $t_i = -1$ |
| 4 | 38 | No constraints |

Sample

Sample Input 1

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

Sample Output 1

```
9
```

Sample Input 2

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

Sample Output 2

```
9
```

Sample Input 3

```
5 5 4
3 4 1 0
4 1 1 3
5 4 7 3
5 3 5 1
2 5 3 2
```

Sample Output 3

```
-1
```

Notes

<https://www.youtube.com/watch?v=55QclsX-8dg>