USACO 2023 December Contest, Gold
Problem 2. Minimum Longest Trip

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Contest has ended.

Submitted; Results below show the outcome for each judge test case

1	2	3	4	5	6	7	8	9	10	11	12
* 14.1mb 8ms	* 14.1mb 7ms	* 14.1mb 7ms	* 14.1mb 7ms	* 33.2mb 466ms	* 33.4mb 479ms	* 29.6mb 315ms	* 29.6mb 330ms	* 14.4mb 13ms	* 14.4mb 13ms	* 32.9mb 464ms	* 32.9mb 464ms

13	14	15	16	17	18	19	20
* 32.9mb 463ms	* 32.9mb 464ms	* 32.4mb 499ms	* 33.2mb 431ms	* 33.2mb 446ms	* 33.2mb 431ms	* 32.9mb 425ms	* 32.9mb 420ms

English (en)

Bessie is going on a trip in Cowland, which has N ($2 \le N \le 2 \cdot 10^5$) towns numbered from 1 to N and M ($1 \le M \le 4 \cdot 10^5$) one-way roads. The ith road runs from town a_i to town b_i and has label l_i ($1 \le a_i, b_i \le N$, $1 \le l_i \le 10^9$).

A *trip* of length k starting at town x_0 is a sequence of towns $x_0, x_1, \ldots, x_k$, such that there is a road from town x_i to town x_{i+1} for all $0 \le i < k$. It is guaranteed that there are no trips of infinite length in Cowland, and that no two roads connect the same pair of towns.

For each town, Bessie wants to know the longest possible trip starting at it. For some starting towns, there are multiple longest trips - out of these, she prefers the trip with the lexicographically minimum sequence of road labels. A sequence is lexicographically smaller than another sequence of the same length if, at the first position in which they differ, the first sequence has a smaller element than the second sequence.

Output the length and sum of road labels of Bessie's preferred trip starting at each town.

INPUT FORMAT (pipe stdin):

The first line contains N and M.

The next M lines each contain three integers a_i, b_i, and l_i, denoting a road from a_i to b_i with label l_i.

OUTPUT FORMAT (pipe stdout):

Output N lines. The ith should contain two space-separated integers, the length and sum of road labels of Bessie's preferred trip starting at town i.

SAMPLE INPUT:

```
4 5
4 3 10
4 2 10
3 1 10
2 1 10
4 1 10
```

SAMPLE OUTPUT:

```
0 0
1 10
1 10
2 20
```

SAMPLE INPUT:

```
4 5
4 3 4
4 2 2
3 1 5
2 1 10
4 1 1
```

SAMPLE OUTPUT:

```
0 0
1 10
1 5
2 12
```

In the following explanation, we let $a_i \xrightarrow{l_i} b_i$ represent the road from a_i to b_i with label l_i.

There are several trips starting from vertex 4, including $4 \xrightarrow{4} 3 \xrightarrow{5} 1$, $4 \xrightarrow{1} 1$, and $4 \xrightarrow{2} 2 \xrightarrow{10} 1$. Of these trips, $4 \xrightarrow{4} 3 \xrightarrow{5} 1$ and $4 \xrightarrow{2} 2 \xrightarrow{10} 1$ are the longest. These trips each have length 2, and their road label sequences are $[4, 5]$ and $[2, 10]$, respectively. $[2, 10]$ is the lexicographically smaller sequence, and its sum is 12.

SAMPLE INPUT:

```
4 5
4 3 2
4 2 2
3 1 5
2 1 10
4 1 1
```

SAMPLE OUTPUT:

```
0 0
1 10
1 5
2 7
```

SAMPLE INPUT:

```
4 5
4 3 2
4 2 2
3 1 10
2 1 5
4 1 1
```

SAMPLE OUTPUT:

```
0 0
1 5
1 10
2 7
```

SCORING:

- Inputs 5-6: All labels are the same.
- Inputs 7-8: All labels are distinct.
- Inputs 9-10: $N, M \leq 5000$
- Inputs 11-20: No additional constraints.

Problem credits: Claire Zhang and Spencer Compton

Contest has ended. No further submissions allowed.

Previous Submissions:

Sun, Dec 17, 2023 02:39:43 EST (C++11)