Competitive Programming SS23

Submit until end of contest

Problem: almost (1.0 second timelimit)

I hope you know the beautiful Union-Find data structure. In this problem, you have to implement something similar, but not identical. Your data structure should also represent a collection of disjoint sets. This time, however, it needs to support the following 3 operations:

$1\ p\ q$ Union the sets containing p and q. If p and q are already in the same set, ignore this command.

$2\ p\ q$ Move p to the set containing q. If p and q are already in the same set, ignore this command.

$3\ p$ Print the number of elements and the sum of elements in the set containing p.

Initially, the collection contains n sets: $\{1\}, \{2\}, \{3\}, \ldots, \{n\}$.

Input   The first line of the input begins contains two space-separated integers n and m ($1 \leq n, m \leq 10^5$), the number of integers and the number of commands, respectively. Each of the next m lines contains a command. For each operation, $1 \leq p, q \leq n$.

Output   For each type-3 command, output 2 integers on a single line: the number of elements and the sum of elements in the given set.

Sample input

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

Sample output

```
3 12
3 7
2 8
```

The sets in the sample input look as follows:

- Initially: $\{1\}, \{2\}, \{3\}, \{4\}, \{5\}$

- After operation 1 1 2: $\{1, 2\}, \{3\}, \{4\}, \{5\}$

- After operation 2 3 4: $\{1, 2\}, \{3, 4\}, \{5\}$ (we omit the empty set that is produced when taking out 3 from $\{3\}$)

- After operation 1 3 5: $\{1, 2\}, \{3, 4, 5\}$

- After operation 2 4 1: $\{1, 2, 4\}, \{3, 5\}$