G - Range Set Modifying Query

Editorial (/contests/abc430/tasks/abc430_g/editorial)

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Time Limit: 4 sec / Memory Limit: 1024 MiB

Score : 625 points

Problem Statement

There are N sets $S_1, \ldots, S_N$. Initially, all sets are empty.

You are given Q queries in the following formats. Process them in order.

- Type 1: Given as `1 L R x`. For each S_i satisfying $L \leq i \leq R$, add x.
- Type 2: Given as `2 L R x`. For each S_i satisfying $L \leq i \leq R$, remove x.
- Type 3: Given as `3 L R`. Find the maximum number of elements among S_i satisfying $L \leq i \leq R$, and the number of sets that achieve this maximum.

Constraints

- $1 \leq N \leq 3 \times 10^5$
- $1 \leq Q \leq 3 \times 10^5$
- For each query, $1 \leq L \leq R \leq N$.
- For type $1, 2$ queries, $1 \leq x \leq 60$.
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \quad Q \\
&\mathrm{query}_1 \\
&\vdots \\
&\mathrm{query}_Q
\end{aligned}
$$

Here, query_i represents the i-th query, and each is given in one of the following formats as shown in the problem statement:

$$1 \quad L \quad R \quad x$$

$$2 \quad L \quad R \quad x$$

$$3 \quad L \quad R$$

Output

Let q be the number of type 3 queries, and print q lines.

The i-th line should contain x, y separated by a space, where x is the maximum number of elements and y is the number of sets that achieve this maximum for the i-th type 3 query.

Sample Input 1 Copy

Copy

```
4 7
1 1 2 10
1 2 4 20
3 1 3
2 1 2 20
1 2 3 10
3 1 2
3 1 4
```

Sample Output 1 Copy

Copy

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

- Initially $(S_1, S_2, S_3, S_4) = (\{\}, \{\}, \{\}, \{\})$.

- The 1-st query adds 10 to S_1, S_2, resulting in $(S_1, S_2, S_3, S_4) = (\{10\}, \{10\}, \{\}, \{\})$.
- The 2-nd query adds 20 to S_2, S_3, S_4, resulting in $(S_1, S_2, S_3, S_4) = (\{10\}, \{10, 20\}, \{20\}, \{20\})$.
- For the 3-rd query, the maximum number of elements among S_1, S_2, S_3 is 2 achieved by S_2, so print `2 1`.
- The 4-th query removes 20 from S_1, S_2, resulting in $(S_1, S_2, S_3, S_4) = (\{10\}, \{10\}, \{20\}, \{20\})$.
- The 5-th query adds 10 to S_2, S_3, resulting in $(S_1, S_2, S_3, S_4) = (\{10\}, \{10\}, \{10, 20\}, \{20\})$.
- For the 6-th query, the maximum number of elements among S_1, S_2 is 1 achieved by S_1, S_2, so print `1 2`.
- For the 7-th query, the maximum number of elements among S_1, S_2, S_3, S_4 is 2 achieved by S_3, so print `2 1`.
