BPC 1 S6 - Painters

Time limit: 3.0s **Memory limit:** 256M

Rich with loot from the temple, you purchased a house and hired a team of workers to renovate it. This team has a strange way of painting. Instead of fully covering a wall with paint, like a normal crew, the i^{th} $(1 \leq i \leq N)$ worker paints a rectangle whose lower-left corner is l_i, b_i and whose upper-right corner is r_i, t_i. Rectangles can overlap, and the crew won't necessarily cover the entire wall. You just arrived home and saw the workers painting a wall the wrong colour. You still have time to tell M $(0 \leq M \leq 1)$ workers to stop and prevent them from painting their rectangle. Find the minimum possible area that will be covered when everyone is done painting.

Constraints

$1 \leq N \leq 3 \times 10^5$

$1 \leq l_i < r_i \leq 10^6$

$1 \leq b_i < t_i \leq 10^6$

Subtask 1 [10%]

$1 \leq N \leq 2 \times 10^3$

Subtask 2 [25%]

$M = 0$

Subtask 3 [65%]

No additional constraints.

Input Specification

The first line contains two integers, N and M.

The following N lines each contain four integers, l_i, b_i, r_i, t_i.

Output Specification

Output one line containing a single integer, the minimum area covered by paint.

Sample Input 1

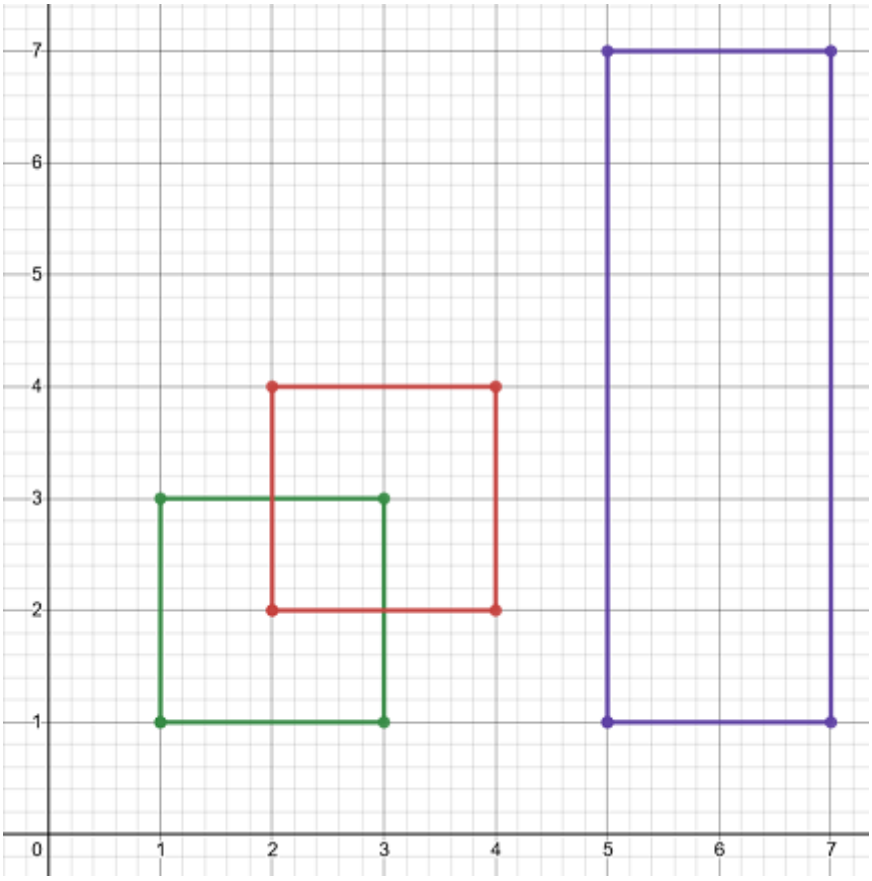
```
3 0
1 1 3 3
2 2 4 4
5 1 7 7
```

Sample Output 1

```
19
```

Explanation for Sample 1

A total of 19 units will be covered by paint.



Sample Input 2

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

Sample Output 2

```
22
```

Explanation for Sample 2

It is optimal to tell the first or fourth painter not to paint their rectangle.