



## 1 Problem

Ayşe loves painting and today she wants to paint a picture of her neighborhood as seen from her window. Her idea for the picture is to paint the buildings in the neighborhood such that all buildings are based on the same line. However, before she can start painting, she has to calculate how many paint tubes she would need for the picture. To do the estimation, she has drawn a two-dimensional map as a sketch of the painting, where she has drawn the outlines of the buildings to be painted.

Ayşe's map uses a  $x - y$  coordinate system in centimeters whose bottom-left corner is  $(0,0)$ . There are  $N$  buildings in the map and each building is in the form of an axis-aligned rectangle whose base sits on the  $y = 0$  line. In other words, one can define each building as a triple  $(L_i, H_i, R_i)$ , where

- $L_i$  is the  $x$ -coordinate of the left edge of the building.
- $H_i$  is the height of the building, i.e., the  $y$ -coordinate of the top edge of the building.
- $R_i$  is the  $x$ -coordinate of the right edge of the building.

Ayşe needs to use one paint tube for each square-centimeter that is occupied by one or more buildings in her map. Even if multiple building occupy the same square-centimeter, one only one tube is necessary to paint that square-centimeter, since only the frontmost building is going to be painted.

Can you find how many paint tubes she needs in total?

## 2 Input Format

```
N
L1 H1 R1
L2 H2 R2
...
LN HN RN
```

$N$  = The number of buildings in the map.

$L_i$  = The  $x$ -coordinate of the left edge of the  $i$ th building.

$H_i$  = The  $y$ -coordinate of the top edge of the  $i$ th building.

$R_i$  = The  $x$ -coordinate of the right edge of the  $i$ th building.

## 3 Output Format

```
T
```

$T$  = Number of paint tubes needed.

## 4 Limits

$1 \leq N \leq 100000$

$0 \leq L_i, H_i, R_i \leq 10^9$

All coordinates are integers.

Time Limit: 1 second

Memory Limit: 256 MB

## 5 Clarifications

- A solution with  $O(N \log N)$  time is expected to get full points in this assignment. However, you can get partial points for a slower solution. If you are unable to code the expected solution, please code a slower one.
- Your solution is expected as a C++ program source named `tubes.cpp` that reads from the standard input and writes to the standard output.
- It is OK to copy code from the sample codes we shared in our course website in ODTÜClass for this assignment.
- You are supposed to submit your code via ODTÜClass, via an auto-grader.
- The grade from the auto-grader is not final. We can later do further evaluations of your code and adjust your grade. Solutions that do not attempt a “reasonable solution” to the given task may lose points.
- We will compile your code on g++ with options: `-std=c++17 -O2 -lm -Wall -Wextra -Wpedantic`
- Late submissions are not allowed.

## 6 Hints

- A plane-sweep approach would be the simplest way to solve this problem.
- Notice that, based on the given limits, the computed result may be so large that it will not fit into a 4-byte integer. Use a `long` to store the result; in fact, you need to use a `long` for any intermediate values that can exceed the `int` bounds.

## 7 Example

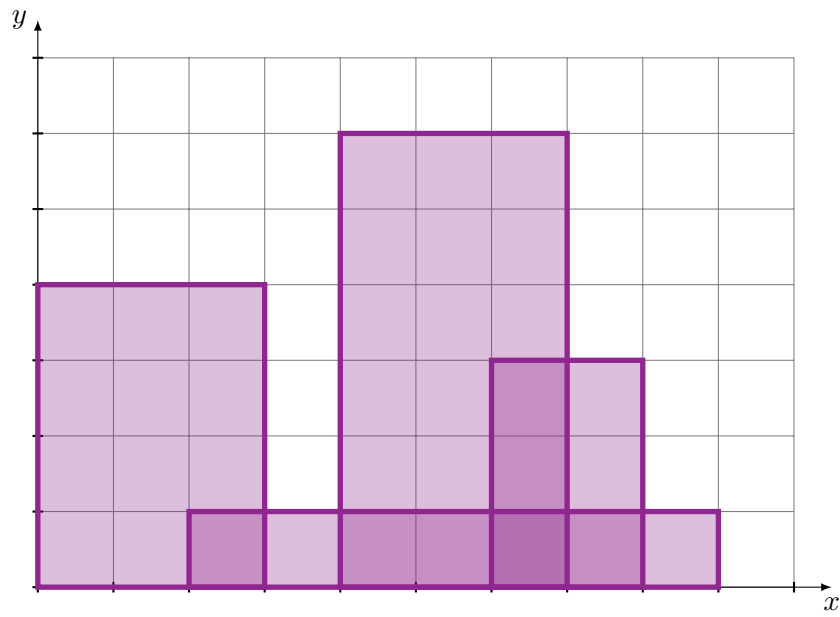
### Sample Input

```
4
0 4 3
2 1 9
4 6 7
6 3 8
```

### Sample Output

```
35
```

See below for a graphical explanation.



There are 35 squares (each of centimeter-square size) that are occupied by buildings.  
In other words, the area occupied by the buildings is 35.