

2025 Canadian Computing Olympiad
Day 2, Problem 3
Shopping Deals

Time Limit: 5 seconds

Problem Description

You are shopping from a store that sells a total of M items. The store layout can be modelled as a two-dimensional plane, where the i -th item is located at the point (x_i, y_i) and has a price of p_i .

The store offers N shopping deals. The i -th shopping deal is specified by a point (a_i, b_i) , and for a cost of c_i , you can obtain one of every item within exactly one of the following four regions of your choice:

- The region of points (x, y) such that $x \leq a_i$ and $y \leq b_i$.
- The region of points (x, y) such that $x \leq a_i$ and $y \geq b_i$.
- The region of points (x, y) such that $x \geq a_i$ and $y \leq b_i$.
- The region of points (x, y) such that $x \geq a_i$ and $y \geq b_i$.

Each shopping deal can only be used at most once. Items can also be purchased individually by paying their respective price p_i .

You want to obtain at least one of each item in the store. Find the minimum total cost you must pay to do so.

Input Specification

The first line of input contains two space-separated integers N and M .

The next N lines of input each contain three space-separated integers, a_i , b_i , and c_i ($-10^9 \leq a_i, b_i \leq 10^9, 1 \leq c_i \leq 10^9$).

The next M lines of input each contain three space-separated integers, x_i , y_i , and p_i ($-10^9 \leq x_i, y_i \leq 10^9, 1 \leq p_i \leq 10^9$).

The following table shows how the available 25 marks are distributed:

Marks Awarded	Bounds on N	Bounds on M	Additional Constraints
1 mark	$1 \leq N \leq 8$	$1 \leq M \leq 20$	None
3 marks	$1 \leq N \leq 70$	$1 \leq M \leq 20$	None
3 marks	$1 \leq N \leq 70$	$1 \leq M \leq 70$	None
4 marks	$1 \leq N \leq 100$	$1 \leq M \leq 100\,000$	No two points (a_i, b_i) or (x_j, y_j) have the same x or y -coordinate.
2 marks	$1 \leq N \leq 100$	$1 \leq M \leq 100\,000$	None
8 marks	$1 \leq N \leq 1\,000$	$1 \leq M \leq 100\,000$	No two points (a_i, b_i) or (x_j, y_j) have the same x or y -coordinate.
4 marks	$1 \leq N \leq 1\,000$	$1 \leq M \leq 100\,000$	None

Output Specification

On a single line, output the minimum total cost that you must pay to obtain at least one of each item.

Sample Input

```
2 4
1 1 3
3 3 13
0 0 2
0 2 5
2 0 4
2 2 3
```

Output for Sample Input

```
12
```

Explanation of Output for Sample Input

Use the first shopping deal on the region $\{(x, y) \mid x \leq 1, y \geq 1\}$ to obtain the second item. Then, purchase items 1, 3, and 4 individually. The total cost is $3 + (2 + 4 + 3) = 12$.