CCO '16 - Splitting Hares

Canadian Computing Olympiad: 2016 Day 1, Problem 2

As you know, some bunnies are good bunnies, and some bunnies are bad bunnies.

You are given the location of all the bunnies, and their "goodness" weight (a positive integer for good bunnies and a negative integer for bad bunnies). No two bunnies are at the same location. Divide them into two groups using a straight line such that the sum of the 'goodness' of the bunnies on one side of the line is as large as possible. A bunny on the line is counted in the sum of the weights on both sides of the line.

Input Specification

The first line contains N $(2 \leq N \leq 4000)$, the number of bunnies. The next N lines contain three space-separated integers: x_i y_i w_i, which indicates that at the point (x_i, y_i) there is a bunny with a goodness weight of w_i $(-10^6 \leq x_i \leq 10^6; -10^6 \leq y_i \leq 10^6; -10\,000 \leq w_i \leq 10\,000)$. The locations (x_i, y_i) will be distinct (i.e. there is no other $j \neq i$ such that $(x_i, y_i) = (x_j, y_j)$).

For 5 of the 25 marks available, $N \leq 200$ and no three locations are collinear.

For an additional 10 of the 25 marks available, no three locations are collinear.

Output Specification

Output the maximum sum of weights that is possible by drawing a straight line and picking all the bunnies which are on one side of that line.

Sample Input

```
6
1 8 4
1 4 6
7 7 2
4 10 -3
4 6 -9
4 2 8
```

Sample Output

```
18
```

Explanation

Take the bunnies with goodness weights of 4, 6 and 8, which are on the "left" side of the line, as shown in the diagram below: