

# IOI Training Camp 2011 – Final 3, 23 June, 2011

## Problem 2 Landfill [Standard]

You have bought a sequence of  $N$  plots of land along a dried-up riverbed. You need to fill these plots to raise their level before you can build on them.

The plots are numbered  $1, 2, \dots, N$ . For  $i \in \{1, 2, \dots, N\}$ , plot  $i$  is currently at height  $h_i$ . You have a massive dumper that allows you to uniformly increase the elevation of  $K$  contiguous plots  $j, j+1, \dots, j+K-1$  at a time. If  $j > N-K$ , your machine will raise all plots from  $j$  to  $N$ .

Due to the peculiar rock formations around the river bed, the amount that you can increase the elevation of a sequence of plots  $j, j+1, \dots, j+K-1$  depends on the plot you start with. The elevation of a segment starting with plot  $i$  can only be increased by an amount  $e_i$  at a time, and this costs you  $c_i$ . Further, you cannot use your dumper to elevate the same segment twice.

Your aim is to ensure that all plots are simultaneously raised as much as possible. You have a total budget of  $C$ . You have to calculate the maximum height  $H$  such that each plot's elevation is at least  $H$  before you exhaust your budget.

For instance suppose you have 4 plots as described on the right, with  $K$  set to 1 and a budget of 20. In this case, the best you can do is to raise all plots to at least height 3, by raising the level of the (unit) segments 1, 2 and 3, yielding a sequence of final heights 4, 8, 10, 3.

$i$	$h_i$	$e_i$	$c_i$
1	1	3	5
2	1	7	3
3	4	6	9
4	3	5	13

On the other hand, suppose you have 4 plots as described on the right, with  $K$  set to 2 and a budget of 20. In this case, the best you can do is to raise all plots to at least height 8, by raising the segments 1, 2 and 2, 3 yielding a sequence of final heights 9, 14, 11, 8.

$i$	$h_i$	$e_i$	$c_i$
1	3	6	2
2	1	7	7
3	4	6	15
4	8	5	13

### Input format

The first line of input contains three integers,  $N$ ,  $C$ , and  $K$ . The next  $N$  lines each contain three integers. For  $i \in \{1, 2, \dots, N\}$ , line  $i+1$  consists of  $h_i$ ,  $e_i$ , and  $c_i$ , in that order, with the interpretation given above.

### Output format

A single integer, the maximum height  $H$  such that all plots finally have height at least  $H$ .

### Test Data

In all subtasks,  $1 \leq N \leq 100$  and for all  $i \in \{1, 2, \dots, N\}$ ,  $0 \leq C, h_i, e_i, c_i \leq 10^6$ .

- *Subtask 1 (20 marks):*  $K = 1$ .
- *Subtask 2 (80 marks):*  $1 \leq K \leq 11$ .

**Sample input 1**

4 20 1  
1 3 5  
1 7 3  
4 6 9  
3 5 13

**Sample input 2**

4 20 2  
3 6 2  
1 7 7  
4 6 15  
8 5 13

**Sample output 1**

3

**Sample output 2**

8

**Time and memory limits**

The time limit for this task is 5 seconds. The memory limit is 128 MB.