

# CS3230 programming assignment 2

Due: 17 Nov 23:59

## 1 Problem statement

You are a coach of an athletic team with  $n$  athletes. You wish to send some of your athletes to a competition.

The rules of the competition are as follows:

- A team consists of  $x$  runners and  $y$  swimmers.
- Each person is only allowed to participate in one sport; in other words a single person cannot be both a runner and a swimmer.
- The score of a team is the total time taken by all  $x$  runners and all  $y$  swimmers.

As the coach, you know that athlete  $i$  ( $1 \leq i \leq n$ ) takes  $a[i]$  time to run and  $b[i]$  time to swim. Your task is to form the best team and find the minimum possible total time taken by choosing  $x$  runners and  $y$  swimmers.

## 2 Input format

The first line of the input consists three space-separated integers,  $n, x, y$ .  $n$  lines then follow. The  $i$ -th of these lines consists of two space-separated integers  $a[i]$  and  $b[i]$ .

## 3 Output format

Output a single integer, the minimum possible total time taken by  $x$  runners and  $y$  swimmers.

## 4 Samples

### Sample input 1

```
3 1 1
```

670 7279  
1264 4798  
7392 135

### Sample output 1

805

### Sample input 2

4 1 1  
8580 8343  
3721 6099  
5225 4247  
940 340

### Sample output 2

4061

### Sample input 3

5 1 1  
6082 1564  
4428 5648  
6992 6200  
3946 9225  
9944 6939

### Sample output 3

5510

## 5 Constraints

- $3 \leq n \leq 10^5$
- $0 \leq x, y \leq n, x + y \leq n$
- $1 \leq a[i] \leq 10^4$  (for all  $1 \leq i \leq n$ )
- $1 \leq b[i] \leq 10^4$  (for all  $1 \leq i \leq n$ )

Required time complexity for full credit (5 points):  $\mathcal{O}(n \log n)$ .

Solutions which run in  $\mathcal{O}(n^2 \log n)$  will receive 4 points - you will only need to pass test cases satisfying  $n \leq 4000$  to get these 4 points.

## 6 Submission instructions and grading

(Same policy as previous assignment) Submit your solution to CodeCrunch in either C++ or Java. You need to pass all test cases to get 5 points (or all test cases satisfying  $n \leq 4000$  to get 4 points).

The tasks will be labelled **full** and **partial**.

- If your final submission to full is correct, you will receive 5 points and your submission to partial will be ignored. If you are confident of your submission to full, you do not need to submit to partial.
- If your submission to full is incorrect, or you did not submit to full, then your solution to partial will be graded, in which you may receive 3 points if your solution to partial is correct.
- If multiple submissions are made, only the last one will be graded.

## 7 Collaboration policy

You may discuss the problems with your classmates, though you should write up your solutions on your own. Please note the names of your collaborators in your submission. You may want to refer to the plagiarism policy from Lecture 2.

You are not allowed to share code.