

分治+中位数

## 第 9 题: poj1723 SOLDIERS

### SOLDIERS

#### Description

N soldiers of the land Gridland are randomly scattered around the country. A position in Gridland is given by a pair  $(x,y)$  of integer coordinates. Soldiers can move - in one move, one soldier can go one unit up, down, left or right (hence, he can change either his  $x$  or his  $y$  coordinate by 1 or -1).

The soldiers want to get into a horizontal line next to each other (so that their final positions are  $(x,y), (x+1,y), \dots, (x+N-1,y)$ , for some  $x$  and  $y$ ). Integers  $x$  and  $y$ , as well as the final order of soldiers along the horizontal line is arbitrary.

The goal is to minimise the total number of moves of all the soldiers that takes them into such configuration.

Two or more soldiers must never occupy the same position at the same time.

#### Input

The first line of the input contains the integer  $N$ ,  $1 \leq N \leq 10000$ , the number of soldiers.

The following  $N$  lines of the input contain initial positions of the soldiers : for each  $i$ ,  $1 \leq i \leq N$ , the  $(i+1)^{\text{st}}$  line of the input file contains a pair of integers  $x[i]$  and  $y[i]$  separated by a single blank character, representing the coordinates of the  $i$ th soldier,  $-10000 \leq x[i], y[i] \leq 10000$ .

#### Output

The first and the only line of the output should contain the minimum total number of moves that takes the soldiers into a horizontal line next to each other.

#### Sample Input

```
5
1 2
2 2
1 3
3 -2
3 3
```

## Sample Output

8

题目大意：

一些士兵站在矩阵的一些方格内，现要把他们移动到一横排，并连续地排成一队，问最少需要移动多少步。

提示：中位数

## 第 10 题: poj3269 Building A New Barn

### Building A New Barn

#### Description

After scrimping and saving for years, Farmer John has decided to build a new barn. He wants the barn to be highly accessible, and he knows the coordinates of the grazing spots of all  $N$  ( $2 \leq N \leq 10,000$ ) cows. Each grazing spot is at a point with integer coordinates  $(X_i, Y_i)$  ( $-10,000 \leq X_i \leq 10,000$ ;  $-10,000 \leq Y_i \leq 10,000$ ). The hungry cows never graze in spots that are horizontally or vertically adjacent.

The barn must be placed at integer coordinates and cannot be on any cow's grazing spot. The inconvenience of the barn for any cow is given the Manhattan distance formula  $|X - X_i| + |Y - Y_i|$ , where  $(X, Y)$  and  $(X_i, Y_i)$  are the coordinates of the barn and the cow's grazing spot, respectively. Where should the barn be constructed in order to minimize the sum of its inconvenience for all the cows?

#### Input

Line 1: A single integer:  $N$

Lines 2.. $N+1$ : Line  $i+1$  contains two space-separated integers which are the grazing location  $(X_i, Y_i)$  of cow  $i$

#### Output

Line 1: Two space-separated integers: the minimum inconvenience for the barn and the number of spots on which Farmer John can build the barn to achieve this minimum.

#### Sample Input

```
4
1 -3
0 1
-2 1
1 -1
```

## Sample Output

10 4

## Hint

The minimum inconvenience is 10, and there are 4 spots that Farmer John can build the farm to achieve this: (0, -1), (0, 0), (1, 0), and (1, 1).

题目大意：

已知  $N$  头牛的位置，问牛舍建在哪里，牛到牛舍的距离和最小。

提示：中位数，外加一些判断

## 第 11 题: poj3579 Median

### Median

### Description

Given  $N$  numbers,  $X_1, X_2, \dots, X_N$ , let us calculate the difference of every pair of numbers:  $|X_i - X_j|$  ( $1 \leq i < j \leq N$ ). We can get  $C(N, 2)$  differences through this work, and now your task is to find the median of the differences as quickly as you can!

Note in this problem, the median is defined as the  $(m/2)$ -th smallest number if  $m$ , the amount of the differences, is even. For example, you have to find the third smallest one in the case of  $m = 6$ .

### Input

The input consists of several test cases.

In each test case,  $N$  will be given in the first line. Then  $N$  numbers are given, representing  $X_1, X_2, \dots, X_N$ , ( $X_i \leq 1,000,000,000$   $3 \leq N \leq 1,00,000$ )

### Output

For each test case, output the median in a separate line.

### Sample Input

```
4
1 3 2 4
3
1 10 2
```

### Sample Output

```
1
8
```

题目大意: 给出一个数列, 然后计算数列里各个数之间的差值的绝对值, 形成一个新数列, 求新数列的中位数

提示: 二分、枚举、中位数