CCC JUNIOR LEC4

Topic: Math problems, two pointer algorithm

今日课程预览

- Review of last week's homework
- 2d coordinate, 2d points representation and exercise
- 2d grid representation and exercise
- Two pointer algorithm
- Past exam
- Homework: Past exams

2D plane

Canadian Computing Competition: 2020 Stage 1, Junior #3

Mahima has been experimenting with a new style of art. She stands in front of a canvas and, using her brush, flicks drops of paint onto the canvas. When she thinks she has created a masterpiece, she uses her 3D printer to print a frame to surround the canvas.

Your job is to help Mahima by determining the coordinates of the smallest possible rectangular frame such that each drop of paint lies inside the frame. Points on the frame are not considered inside the frame.

Input Specification

The first line of input contains the number of drops of paint, N, where $2 \leq N \leq 100$ and N is an integer. Each of the next N lines contain exactly two positive integers X and Y separated by one comma (no spaces). Each of these pairs of integers represent the coordinates of a drop of paint on the canvas. Assume that $X \leq 100$ and $Y \leq 100$, and that there will be at least two distinct points. The coordinates $(0, 0)$ represent the bottom-left corner of the canvas.

For 12 of the 15 available marks, X and Y will both be two-digit integers.

Output Specification

Output two lines. Each line must contain exactly two non-negative integers separated by a single comma (no spaces). The first line represents the coordinates of the bottom-left corner of the rectanglular frame. The second line represents the coordinates of the top-right corner of the rectangular frame.

Continue

Output Specification

Output two lines. Each line must contain exactly two non-negative integers separated by a single comma (no spaces). The first line represents the coordinates of the bottom-left corner of the rectanglular frame. The second line represents the coordinates of the top-right corner of the rectangular frame.

Sample Input 1

```
5
44,62
34,69
24,78
42,44
64,10
```

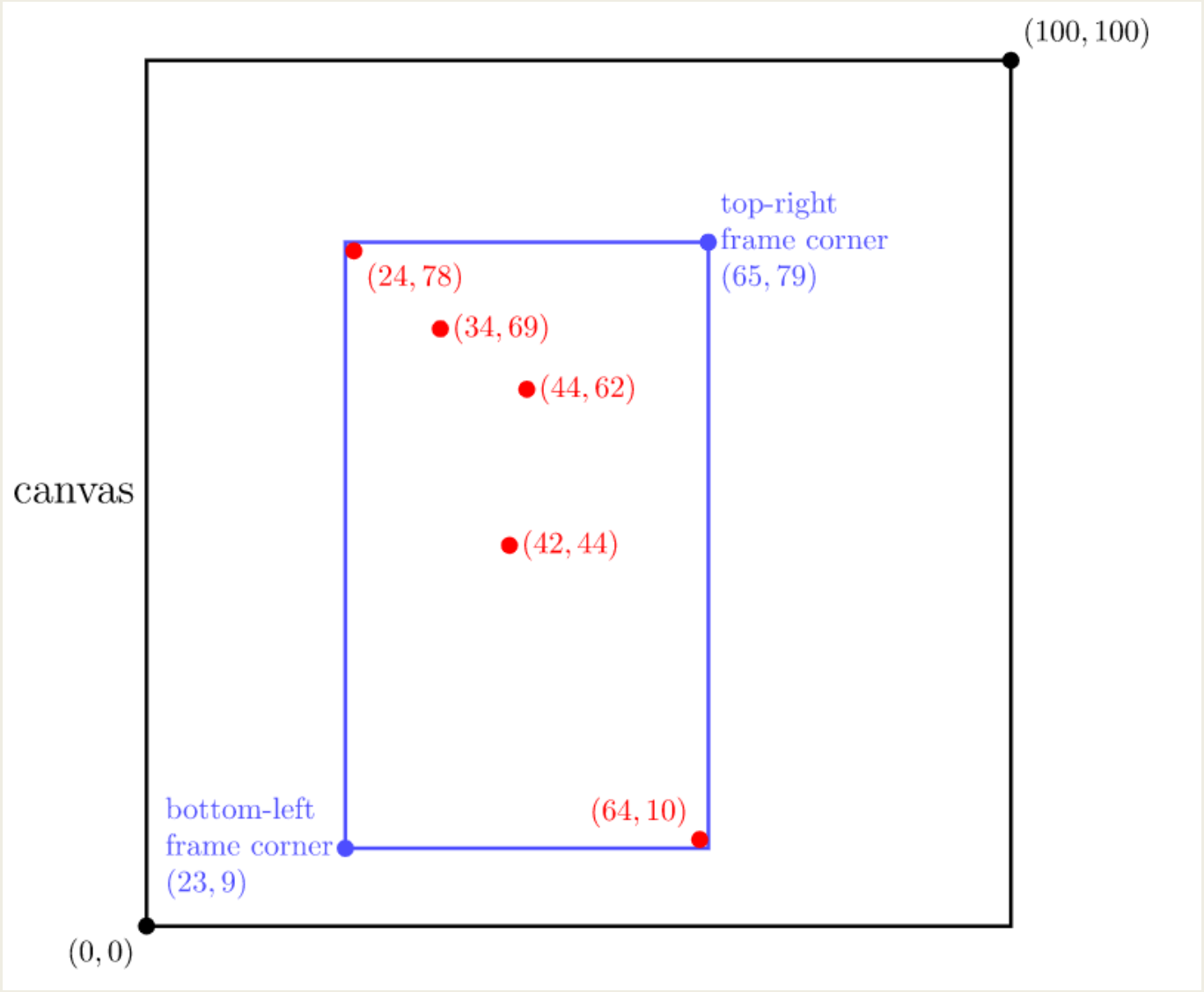
Copy

Output for Sample Input 1

```
23,9
65,79
```

Copy

Explanation



Problem J3: Exactly Electrical

Time limit: 1 second

Problem Description

You live in Grid City, which is composed of integer-numbered streets which run east-west (parallel to the x-axis) and integer-numbered avenues which run north-south (parallel to the y-axis). The streets and avenues have infinite length, and there is a street for every integer y-coordinate and an avenue for every x-coordinate. All intersections are labelled by their integer coordinates: for example, avenue 7 and street -3 intersect at (7,-3).

You drive a special electric car which uses up one unit of electrical charge moving between adjacent intersections: that is, moving either north or south to the next street, or moving east or west to the next avenue). Until your battery runs out, at each intersection, your car can turn left, turn right, go straight through, or make a U-turn. You may visit the same intersection multiple times on the same trip.

Suppose you know your starting intersection, your destination intersection and the number of units of electrical charge in your battery. Determine whether you can travel from the starting intersection to the destination intersection using the charge available to you in such a way that your battery is empty when you reach your destination.

2D GRID REPRESENTATION

Output Specification

Output `Y` if it is possible to move from the starting coordinate to the destination coordinate using exactly t units of electrical charge. Otherwise output `N`.

Sample Input 1

```
3 4
3 3
3
```

Output for Sample Input 1

```
Y
```

INPUT1

Explanation for Output for Sample Input 1

One possibility is to travel from $(3, 4)$ to $(4, 4)$ to $(4, 3)$ to $(3, 3)$.

Sample Input 2

```
10 2
10 4
5
```

Output for Sample Input 2

```
N
```

INPUT 2

Two pointer algorithm in array

- For a sorted array, how to find the pair that sums up to a certain number.
- For example for array {10, 20, 30, 45, 50}. Find the pair efficiently that add up to 70.

Problem J5: Tandem Bicycle

Problem Description

Since time immemorial, the citizens of Dmojistan and Pegland have been at war. Now, they have finally signed a truce. They have decided to participate in a tandem bicycle ride to celebrate the truce. There are N citizens from each country. They must be assigned to pairs so that each pair contains one person from Dmojistan and one person from Pegland.

Each citizen has a cycling speed. In a pair, the fastest person will always operate the tandem bicycle while the slower person simply enjoys the ride. In other words, if the members of a pair have speeds a and b, then the *bike speed* of the pair is $\max(a, b)$. The *total speed* is the sum of the N individual *bike speeds*.

For this problem, in each test case, you will be asked to answer one of two questions:

- Question 1: what is the minimum total speed, out of all possible assignments into pairs?
- Question 2: what is the maximum total speed, out of all possible assignments into pairs?

PAST EXAM

Output Specification

Output the maximum or minimum total speed that answers the question asked.

Sample Input 1

```
1
3
5 1 4
6 2 4
```

Output for Sample Input 1

```
12
```

INPUT1

Sample Input 2

```
2
3
5 1 4
6 2 4
```

Output for Sample Input 2

```
15
```

INPUT 2

Sample Input 3

```
2
5
202 177 189 589 102
17 78 1 496 540
```

Output for Sample Input 3

```
2016
```

INPUT 3