GREATEST RECTANGLE

PROBLEM STATEMENT

BY

KHRITISH K BEHERA

khritish.official@gmail.com

Problem Source:
Zonal Computing Olympiad 2015

Problem:
We have a rectangle region that is 100 000 units along X-axis and 500 units alonlikg the Y-axis.

We assume that the origin (0,0) is at the bottom-left corner of the region, so that the top-left corner is at (0,500), the bottom-right at (100 000,0) and the top-right corner at (100 000,500), We are also given the coordinates of a set of N points inside this region. The points have only integer coordinates and do not appear along the X-axis or Y-axis.

We would like to draw a rectangle, with its base on the X-axis, of maximum area within the region such that it does contain any of the N points in its interior. More specifically, the points may appear on the boundary but cannot be properly inside the rectangle.

For example, if there are 5 points:
(1,4),(2,3),(3,2),(5,1) and (5,2). Then the rectangle whose bottom-left and top-right corners are given (0,0) and (2,3) is possibility and its area is 6. Another possibility is the rectangle with bottom-left and top-right corners are (3,0) and (5,500) with area 1000. The rectangle with bottom-left at (2,3) and top-right at (100 000,500) is not valid since its base does not lie on the X-axis. The largest rectangle that meets the requirements in this case is the one with its bottom-left corner at (5,0) and top-right at (100 000,500) with area 49 997 500.

Your program should take a description of N points and output the size of the maximum rectangle along with their coordinates, satisfying the above property that can be drawn within the 100 000 x 500 region.

In Python implementation of the program, the following coordinate convention followed:

The rectangle coordinates are:

```
        (x1,y2)---------------------------------------------(x2,y2)
              |                                           |
              |                                           |
              |                                           |
              |                                           |
              |                                           |
              |                                           |
        (x1,y1)---------------------------------------------(x2,y1)
```