C. Oriented Minimum Bounding Box

Time Limit: 3 seconds

Problem description

Oriented Minimum Bounding Box (OMBB) is one of the very common techniques in computer vision. You can find it in object detections, object tracking...etc. Nobody in this field does know the OMBB. In image processing, we mainly handle the data in 2-dimensional space. Consider D is the set of the point cloud that made the object. Assume that D always have more than 3 different data points. Each data point represented by a coordinate x, y.

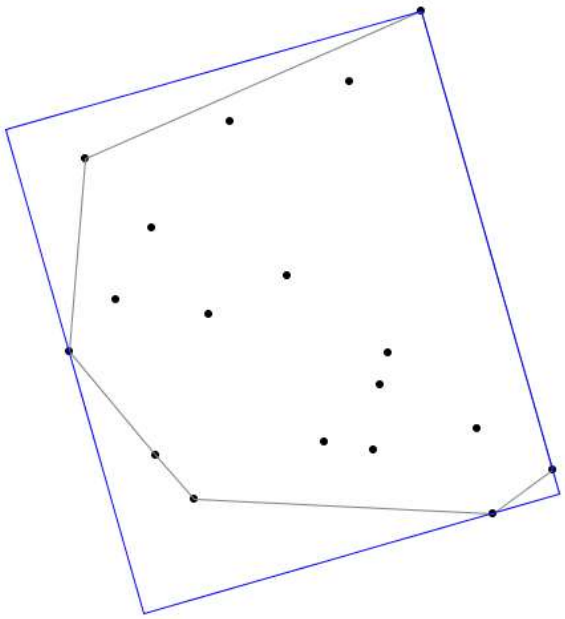
What you need to do:

- is to Find the area of the OMBB to the given object.

Hint:

The step to find the OMBB's area.

1. Find the convex hull that illustrated by gray path in the below figure.



2. Consider every edge of the convex hull to align the edge of the OMBB.
3. Compute the area of the OMBB.

Input:

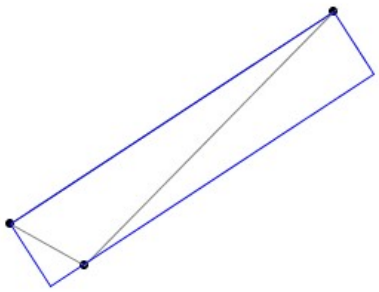
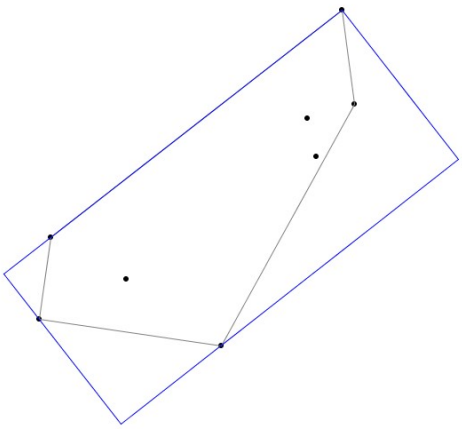
First line contains N – an integer number indicates the number of data point to compute

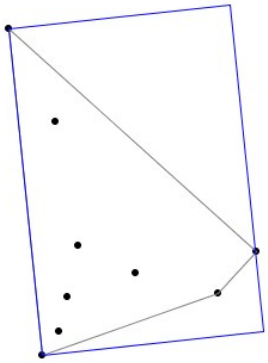
N next lines are data point information. Line i^{th} is related to the information of data point i^{th} in the format of x, y which are real numbers.

Output:

The OUTPUT is converted to Integer, but you should use double for better computation with minimum errors.

See some sample test cases:

Test Case	INPUT	OUTPUT	Illustration
1	3 555.0 420.0 387.0 591.0 337.0 563.0	13253	
2	8 522.0 380.0 565.0 321.0 223.0 471.0 308.0 518.0 551.0 215.0 210.0 563.0 415.0 593.0 512.0 337.0	103495	

3	9 321.0 366.0 388.0 493.0 282.0 288.0 340.0 470.0 489.0 475.0 457.0 510.0 331.0 513.0 310.0 562.0 324.0 542.0	51481	
4	12 221.0 576.0 205.0 504.0 478.0 380.0 358.0 291.0 237.0 478.0 225.0 393.0 355.0 354.0 431.0 448.0 480.0 323.0 447.0 517.0 470.0 495.0 428.0 456.0	75844