Problem

White Night 3

Time limit: 3 seconds

Little Cyan Fish wants to color n points cyan or white. The i-th point is at (x_i, y_i). The points are pairwise distinct and are the vertices of a strictly convex polygon, listed in counterclockwise order.

Let H_c be the convex hull of the cyan points, and let H_w be the convex hull of the white points. A convex hull is the smallest convex set containing the given points. The convex hull of an empty set is empty; a convex hull consisting of a point or a line segment has area zero.

Find the maximum possible area of $H_c \cap H_w$, the region common to the two convex hulls.

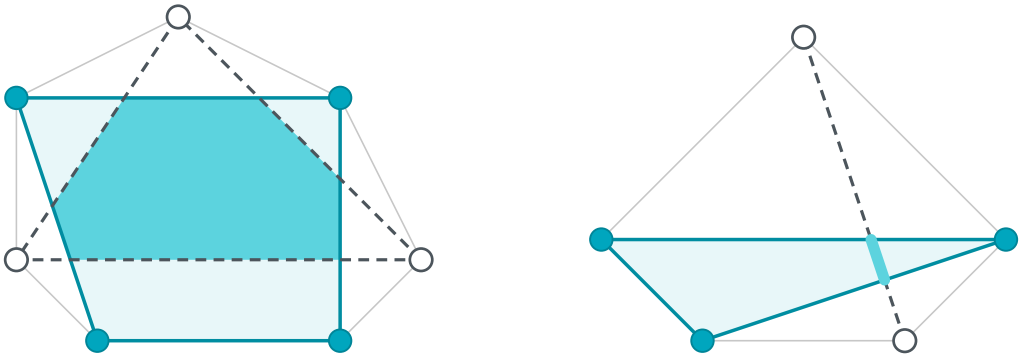


Illustration of the first two sample test cases (first on the left, second on the right).

Input

There are multiple test cases. The first line of the input contains a single integer T ($1 \le T \le 10^4$), indicating the number of test cases.

For each test case, the first line contains a single integer n ($3 \le n \le 10^5$), indicating the number of points. Each of the following n lines contains two integers x_i and y_i ($-10^9 \le x_i, y_i \le 10^9$), indicating the coordinates of the i-th point.

It is guaranteed that the sum of n over all test cases does not exceed 10^5.

Output

For each test case, output a single line containing a real number, indicating the maximum possible area of the intersection of the two convex hulls.

Your answer will be accepted if its absolute or relative error does not exceed 10^{-8}. Formally, let your output be a and the jury's answer be b; your output is accepted if and only if $\frac{|a-b|}{\max(1,|b|)} \le 10^{-8}$.

Sample Input 1

```
3
7
0 0
3 0
4 1
3 3
1 4
-1 3
-1 1
5
0 0
2 0
3 1
1 3
-1 1
7
-1000000000 -1000000000
-500000001 -500000002
499999998 499999995
999999998 999999994
500000000 499999997
-499999999 -500000000
-999999999 -999999999
```

Sample Output 1

```
5.944444444444444444
0
2.458333333333333404
```

In the first sample test case, Little Cyan Fish colors points 1, 2, 4, and 6 cyan, and the other points white. The cyan quadrilateral and the white triangle overlap in an area of $\frac{107}{18}$, which is the maximum possible area.

In the second sample test case, at least one color has at most two points, so the intersection has area zero. The figure shows points 1, 3, and 5 colored cyan; the white convex hull is the line segment joining points 2 and 4.

In the third sample test case, coloring points 1, 4, and 6 cyan and the other points white gives the maximum intersection area of $\frac{59}{24}$.