Problem G. Convex Polygon MST

- Time Limit: 7 sec

Problem Statement

There is a convex polygon with n vertices on a plane. Let V be the set of vertices of this convex polygon. After removing all the edges of the convex polygon, you will create a tree with n vertices by repeating the following operation $n-1$ times:

- Select two distinct vertices $x, y \in V$. Add an edge between vertices x and y. If we denote the Euclidean distance between vertices x and y as $d(x,y)$, you gain a score of $(d(x,y))^2$ points.

Find the maximum possible total score obtained by $n-1$ operations.

Input

The input file contains multiple test cases. The first line contains an integer t representing the number of test cases. Following that, t test cases are given. Each test case is given in the following format:

$$
\begin{aligned}
&n \\
&x_1\ y_1 \\
&\vdots \\
&x_n\ y_n
\end{aligned}
$$

Here, n is an integer representing the number of vertices, where $3 \leq n \leq 120{,}000$. The sum of all n values in a single input file is guaranteed to be less than or equal to 120,000.
x_i and y_i represent the coordinates of the i-th vertex, where each coordinate is an integer between -10^9 to 10^9. The vertices are given in counterclockwise order when viewed from the centroid of the convex polygon. Three different vertices of the convex polygon do not lie on a single line.

Output

Output the maximum possible total score obtained by $n-1$ operations.

Note

- The Euclidean distance between coordinates (x_1, y_1) and (x_2, y_2) is calculated as $\sqrt{|x_1 - x_2|^2 + |y_1 - y_2|^2}$.
- Note that the answer can exceed 2^{64}.

Sample Input	Sample Output
2 4 0 0 1 0 1 1 0 1 6 986288255 165031740 -353860917 -935298054 -173584601 -984818960 141060317 -990001002 341839727 -939758266 662792114 -748803453	5 10426936519662708146