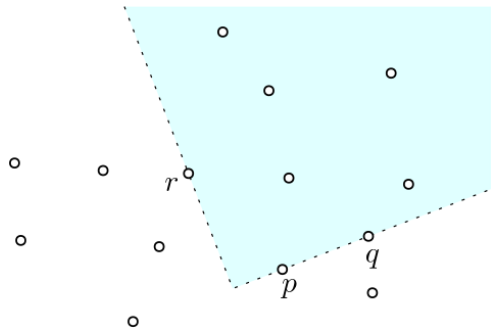
Problem K
Quadrants
Time Limit: 2 Seconds

This problem is about quadrants. What are quadrants? Let us begin with any two perpendicular lines ℓ and ℓ' in the plane $\mathbb{R}^2$. If you subtract the two lines ℓ and ℓ' from the whole plane $\mathbb{R}^2$, you obtain four connected, unbounded regions. Each of the four regions is called a *quadrant*. Note that the boundary of a quadrant does not belong to itself.

Now, consider a set P of points in the plane $\mathbb{R}^2$. We are interested in quadrants defined by the set P of points. Specifically, let $\mathfrak{Q}$ be the set of quadrants Q such that the boundary of Q contains exactly three points of P. Each quadrant $Q \in \mathfrak{Q}$ is called a *k-quadrant* if Q contains exactly k points of P in its interior. The figure below shows an example in which the set P consists of 14 points (small circles) and you can see a 5-quadrant $Q \in \mathfrak{Q}$ (shaded in cyan), whose boundary contains three points $p, q, r \in P$.



Given a set P of n points as input, write a program that computes the number of k-quadrants for every $0 \leq k \leq n-3$.

Input
Your program is to read from standard input. The input starts with a line containing a single integer n $(3 \leq n \leq 2{,}000)$, where n is the number of points in the input set P. In each of the following n lines, given are two integers x and y, both ranging from -10^6 to 10^6, inclusively, that represent the x- and y-coordinates of an input point (x, y) in P. You may assume that no two input points have the same coordinates, that there are no three points in P lying in a line, and that there are no two perpendicular lines ℓ and ℓ' in the plane $\mathbb{R}^2$ such that $|\ell \cap P| \geq 2$ and $|\ell' \cap P| \geq 2$.

Output
Your program is to write to standard output. Print exactly $n-2$ lines. The i-th line of your output for each $1 \leq i \leq n-2$ must contain a single integer that represents the number of $(i-1)$-quadrants with respect to the input set P of n points.

The following shows sample input and output for three test cases.

Sample Input 1	Output for the Sample Input 1
3 0 0 1 2 -1 4	2

Sample Input 2	Output for the Sample Input 2
4 0 0 1 2 -1 4 -1 1	0 4

Sample Input 3	Output for the Sample Input 3
10 47 20 4 30 3 21 44 12 46 34 18 18 19 50 48 23 22 3 19 22	2 12 20 18 20 30 28 16