# Fruit Ninja

Problem Code: NINJA

Design Challenge

Task Description

You must have heard of the famous game *Fruit Ninja*! In the game, fruits pop up and you cut them using finger strokes. You receive more points if you cut more fruits with one stroke. It is thus very intriguing to see for any group of fruits, whether there exists a way to cut them using a single stroke.

In this problem we apply a simplified version of fruit ninja. We consider the finger stroke to be a straight line. Each fruit is a unit-size circle (radius = 1) on the 2D plane. If the stroke line intersects with any part of the fruit (including its boundary), the stroke cuts that fruit. The fruits do not move and we ignore the time to perform a stroke. Fruits may overlap (as they do in the game!).

You are given the coordinates of the fruits' circle centers. Therefore each fruit is represented as a 2D point. See examples below for details.
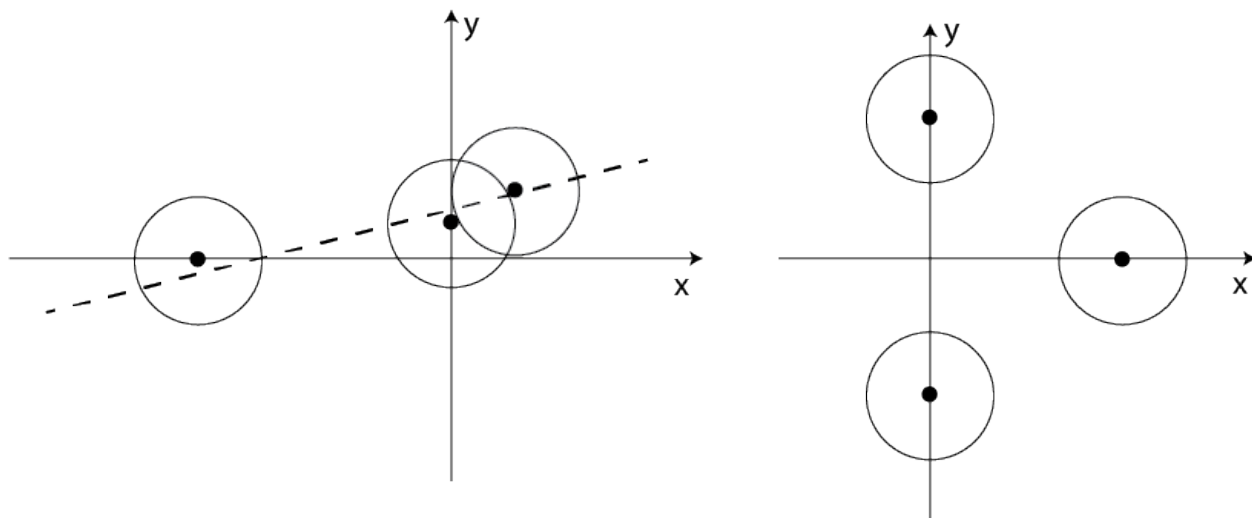
Constraints

$n \geq 1$.

Examples

Case 1: $n = 3$ fruits are located at (1, 1), (0, 0.5) and (-4, 0).

Answer: *Yes*

See the illustration on the left. You can cut the three fruits using the stroke indicated by the dashed line.

Case 2: $n = 3$ fruits are located at (0, 2), (0, -2) and (3, 0).

Answer: *No*

See the illustration on the right. There is no way you can perform a stroke to cut all the three fruits.

Case 3: $n = 4$ fruits are located at (1, 1), (1, -1), (-1, 1), (-1, -1).

Answer: *Yes*

Note that your stroke is considered to cut the fruit if it touches the fruit's boundary. So in this case you can choose the line $x = 0$ (or $y = 0$).

Requirements

Time: $O(n^3)$ **Space:** $O(n)$