[I2A] - Convex Hull

Time: 1 sec / Memory: 256 MB

Background

Read the Graham-Scan algorithm and implement it.

You may want to use Vector Sorting (/@LTYI96fQQOWFYWr2vFQsWg/rkNjo5BnA) as a building block for implementing the Graham-Scan algorithm.

Problem Statement

Compute the Convex Hull for n distinct points $(x_1, y_1), (x_2, y_2), \ldots, (x_n, y_n)$ in the plane.

Hint: Use `long long` data type to prevent integer overflow.

Input

The first line contains an integer n, where $1 \leq n \leq 10^5$.
The following n lines each contain two integers representing the coordinates of each point.

You may assume that the input points are all distinct.

Output

In the first line, print the number of vertices of the convex hull plus 1, indicating the total number of integers you will print in the next line.

In the second line, output the indexes of the vertices of the Convex Hull in order, either clockwisely or counter-clockwisely.
The sequence ends with the first vertex you output.

Note that, you must label the points with the order they are input.
For example, the first input point is indexed as 1, the second as 2, and so on.

Example

Input:

```
4
0 0
15 15
15 -15
20 0
```

Output:

```
5
4 2 1 3 4
```