Problem H
Cities: Skylines - Dynasty of Egypt

Time limit: 5 seconds
Memory limit: 2048 megabytes

Problem Description

In ancient Egypt, the wise Pharaoh dreamed of building a grand city filled with towering pyramids. However, he loved stargazing and wanted to ensure that the pyramids did not block his view of the night sky. To achieve this, he asked his trusted architect to investigate the skyline formed by the pyramids.

From the Pharaoh's favorite viewing platform, the sightlines could be imagined as a two-dimensional plane. The architect had already investigated the relative coordinates of all the pyramids on this plane. Each pyramid could be represented as a triangle with three points $(x_1, 0)$, (x_2, y_2), and $(x_3, 0)$. To ensure structural safety, each pyramid's coordinates must satisfy $x_1 \leq x_2 \leq x_3$, and each pyramid occupies a non-zero area in the view.

Due to the large number of pyramids, the architect sought your help to calculate the overall city skyline formed by these pyramids.

Input Format

The first line contains a positive integer n, the number of pyramids. The next n lines each contain four integers x_1, x_2, y_2, and x_3, representing the coordinates of the i-th pyramid's vertices in the form: $(x_1, 0), (x_2, y_2), (x_3, 0)$

Output Format

The first line should output a positive integer n representing the number of turning points in the contour line. Following that, there should be n lines, each containing two numbers representing the coordinates.

Your answer is considered correct if its absolute or relative error doesn't exceed 10^{-6}. Namely, if your answer is a, and the jury's answer is b, then your answer is accepted, if $\frac{|a-b|}{max(1,b)} \leq 10^{-6}$.

Technical Specification

- $1 \leq n \leq 10^5$

- $-10^6 \leq x_1 < x_3 \leq 10^6$, for each point

- $x_1 \leq x_2 \leq x_3$, for each point

- $0 < y_2 \leq 10^6$, for each point

- $x_1, x_2, x_3, y_2 \in \mathbb{Z}$, for each point

- Ensure that all points are not duplicated.

- Ensure that no three lines intersect at the same point.

Sample Input 1

```
4
1 8 3 8
2 4 5 9
3 5 5 6
4 6 4 7
```

Sample Output 1

```
13
1.000000000000000  0.000000000000000
2.206896551724138  0.517241379310345
4.000000000000000  5.000000000000000
4.714285714285714  4.285714285714286
5.000000000000000  5.000000000000000
5.250000000000000  3.750000000000000
5.666666666666667  3.333333333333333
6.000000000000000  4.000000000000000
6.333333333333333  2.666666666666667
6.600000000000000  2.400000000000000
8.000000000000000  3.000000000000000
8.000000000000000  1.000000000000000
9.000000000000000  0.000000000000000
```

Note

The following picture represents sample testcase 1.