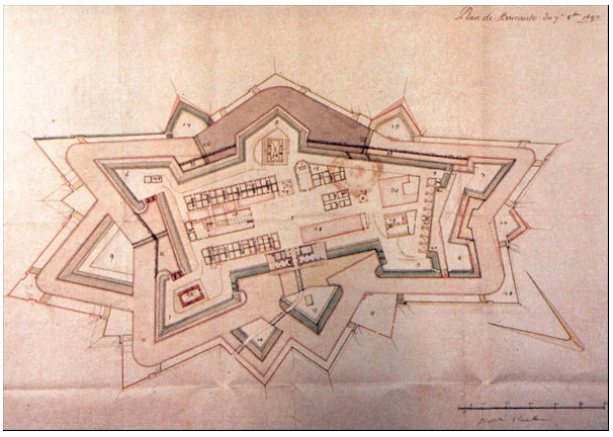


E: Building the Fort

Time limit: 0.5 second



You are a Roman general setting up a defence fort against the Barbarians.

You only know how to build straight walls, so your fort is going to be polygon-shaped.

Due to the shape of the land, which has multiple hills located at all the integer coordinates, you know that the enemy artillery can only be installed in very specific ways, and that higher positions inside your fort are more vulnerable, which means that:

- all the vertices of the polygon must have integer coordinates between 1 and 10^9 (inclusive);
- N known points $(x_i, y_i), i = 1, \ldots, N$, with integer coordinates between 1 and 10^9 (inclusive), initially given, must be among the vertices of the polygon;
- no point with integer coordinates can be located strictly inside the polygon, as it would be vulnerable to the enemy artillery otherwise;
- the polygon has to be simple[1] (obviously, the fort needs to be closed, and you don't know how to build intersecting walls).

In addition, due to the cost of building this fort and the limited materials, you can only afford to build a polygon with a number of vertices smaller than or equal to $3N$.

It can be shown that such a polygon always exists.

Input

The first line contains the integer N. The next N lines contain two space-separated integers x_i, y_i, the points that must be among the vertices of the polygon.

Output

The first line should contains K, the number of vertices of the polygon.

The next K lines should contain two space-separated integers x'_i, y'_i, the coordinates of the vertices of the polygon. They must be in an order that forms a closed and non-intersecting path that defines the outline of the polygon.

If there are multiple solutions, you can output any of them.

Limits

- $3 \leqslant N \leqslant 1\,000$;

[1] A simple polygon is a polygon formed by a single closed path that does not intersect itself or overlap itself.

- $1 \leqslant x_i \leqslant 10^9$ for $i = 1, \ldots, N$;
- $1 \leqslant y_i \leqslant 10^9$ for $i = 1, \ldots, N$;
- All (x_i, y_i) are unique;
- $1 \leqslant x'_i \leqslant 10^9$ for $i = 1, \ldots, K$;
- $1 \leqslant y'_i \leqslant 10^9$ for $i = 1, \ldots, K$;
- All (x'_i, y'_i) must be unique.

Sample Input

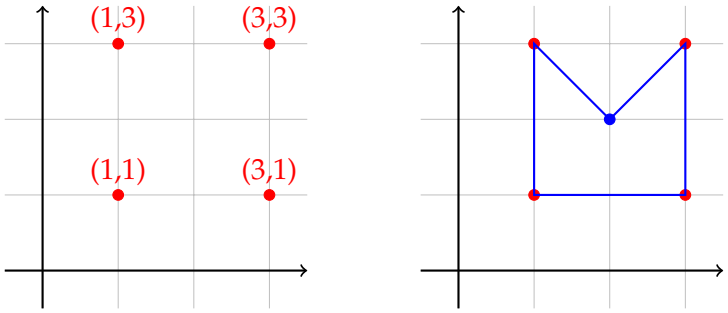
```
4
1 1
1 3
3 1
3 3
```

Sample Output

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

Sample Explanation

The following is a possible solution for the sample input:



On the other hand, the following polygons are **not** valid solutions:

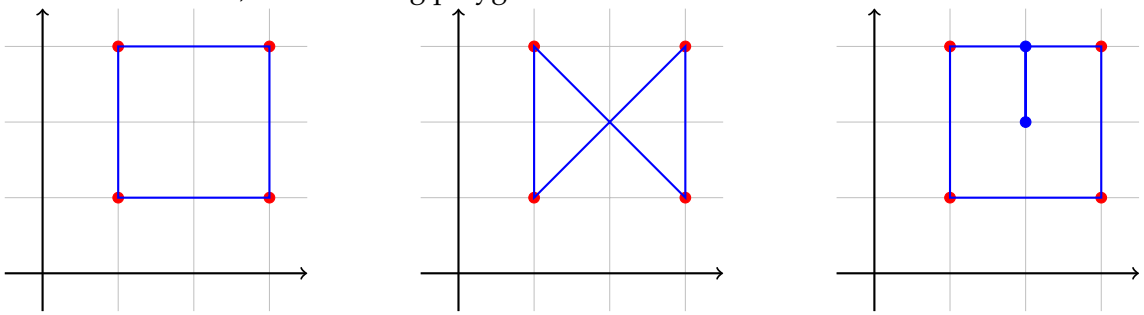


Image credits: Plan de fort Barraux par Vauban, Public domain, via Wikimedia Commons