

Problem A

Fractal

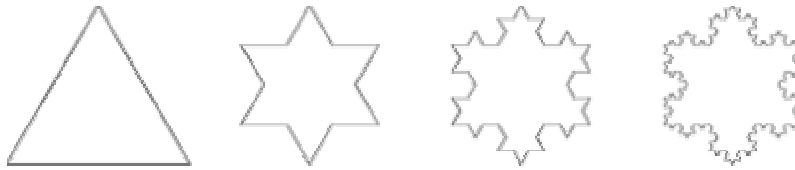
Input: Standard Input

Output: Standard Output

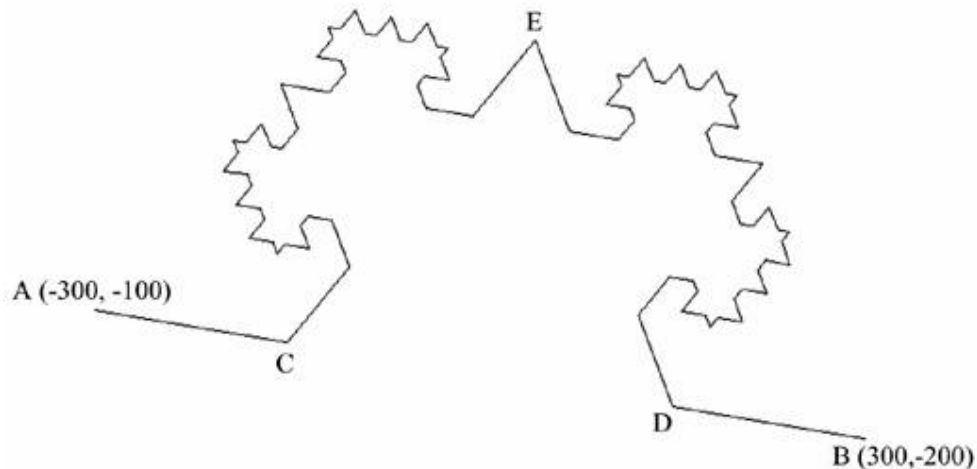
Time Limit: 3 Seconds

A fractal is a rough or fragmented geometric shape that can be subdivided in parts, each of which is (at least approximately) a smaller copy of the whole. Fractals are generally self-similar (bits look like the whole) and independent of scale (they look similar, no matter how close you zoom in).

Below you can see picture of a well-known fractal. Actually this picture shows the steps of the making of a fractal:



In this problem you will have to draw a fractal very similar to the one above. The fractal that you have to work with is given below:



In real life it is impossible to draw a fractal exactly according to its definition because somewhere we must stop drawing it. For example in the picture above we have stopped drawing when the length of the line on which a triangle has to be drawn is less than five.

Now let us discuss in detail how the fractal is to be drawn. You will be given the coordinates of **A** (x_1, y_1) and **B** (x_2, y_2). In the figure above the coordinate of **A** is **(-300, -100)** and the coordinate of **B** is **(300, -200)**. **C** and **D** are the points, which divides **AB** in ratio **1:3** and **3:1**. So now you have to draw an equilateral triangle **CED** based on **CD**, of course the base is erased. And then you find two points, which divide **CE** in the ratio **1:3** and **3:1**. The same thing applies for **ED** and this process continues recursively up to the point when the length of the side of drawn equilateral triangles is less than a certain value **T**. Now if you look at the picture above you will find that it has two terminal points **A** and **B** and many corner points like **C**, **E** and **D**. Your job is to find the coordinates of these terminal points and corner points and print them in a certain order.

Input

The input file contains less than **10** lines of input.

Each line contains five integers. The first four integer numbers are the coordinates x_1, y_1, x_2, y_2 ($-10000 < x_1, y_1, x_2, y_2 < 10000$) and the last integer T ($1 < T < 1000$) is the terminating threshold value. I mean when the line to be drawn will be less than T drawing will stop. The value of T will be such that the length of the line to be drawn will never be equal to T .

Input is terminated by a case whose value of T is less than **1**. This case should not be processed.

Output

For each line of input you should output $S+2$ lines of outputs. The first line is the serial no of the output as shown in the sample output. Next line contains the number S , where S is the number of vertex and terminal points in the drawn fractal. Each of the S lines after that contains two floating-point numbers indicating the coordinate of one terminal point or vertex. The terminal points should be sorted in increasing order of the value of abscissa of the coordinate. In case of a tie the points should be sorted in ascending order of the ordinate. Two values are considered same if they differ by a value less than $1e-8$. All printed floating point numbers have five digits after the decimal point. Errors less than $2*10^{-5}$ will be tolerated.

Sample Input

```
10 10 -10 -10 5.1
-10 -10 10 10 5.1
5 5 -5 -8 .3
```

Output for Sample Input

```
Case 1:
11
-10.00000 -10.00000
-5.00000 -5.00000
-1.58494 -5.91506
0.24519 -12.74519
5.00000 5.00000
5.24519 -7.74519
5.91506 1.58494
7.74519 -5.24519
8.66025 -8.66025
10.00000 10.00000
12.74519 -0.24519
Case 2:
11
-12.74519 0.24519
-10.00000 -10.00000
-8.66025 8.66025
-7.74519 5.24519
-5.91506 -1.58494
-5.24519 7.74519
-5.00000 -5.00000
-0.24519 12.74519
1.58494 5.91506
5.00000 5.00000
10.00000 10.00000
```