

CP #10: Light and Transparencies

When light traverses a transparent lm, some energy is absorbed and the rest is transmitted to other side of the lm. The percentage of light that is transmitted may be defined as Transparency Coefficient.

When several lms are in the same direction of light, the correspondent transparency coefficients are multiplied. The goal of this problem is to determine the percentage of light that is projected on the ground, after traversing a given set of lms.

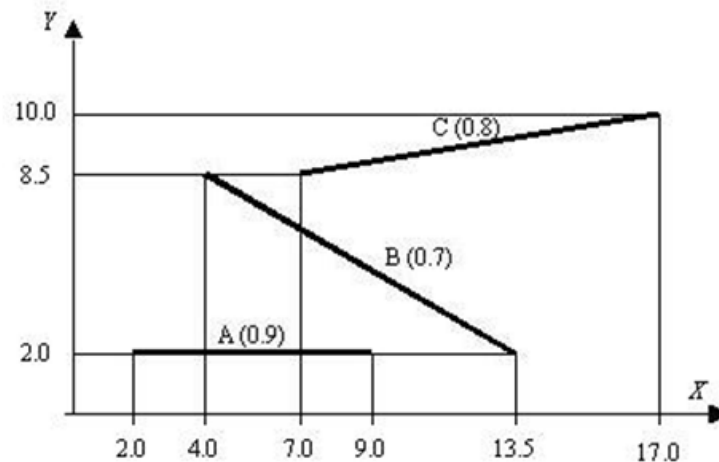


Figure 1 Three lms and correspondent Transparent Coefficients.

Consider the set of line segments in g. 1. They represent transparent lms in the above conditions (transparency coefficients are written in brackets). Also consider that light is propagating in the vertical direction, from top to bottom.

Accordingly to the figure, the end points of the lines define a set of projected segments onto the ground (ground is represented by the X axis). For each projected segment, it is possible to evaluate the percentage of light that reaches the ground and, for the entire set of segments, a list can be obtained:

```
-inf, 2.0 -> 1.000
2.0, 4.0 -> 0.900
4.0, 7.0 -> 0.630
7.0, 9.0 -> 0.504
9.0, 13.5 -> 0.560
13.0, 17.0 -> 0.800
17.0, +inf -> 1.000
```

To simplify the problem, it is assumed that neither vertical lines nor crossing lines are given. Also no coincidences exist in the vertical projection of all given points (in other words, the X coordinates of the end points are all different from each other). On the other hand, a coordinate may be any real value from 1 to +1.

Input Format

The input begins with a single positive integer on a line by itself indicating the number of the cases following, each of them as described below. This line is followed by a blank line, and there is also a blank line between two consecutive inputs.

The input is a text file containing several lines, as follows.

The first line of the input contains the number NL (integer format) of line segments. It is followed by NL lines of text defining, each one, a line segment.

Accordingly to the above explanations, a line segment is defined by the coordinates of its two end points P1 and P2 and the transparency coefficient r, in the sequence x1 y1 x2 y2 r, separated by single spaces (all the values are in the real format). No order is considered for the two points P1 and P2.

Output Format

For each test case, the output must follow the description below. The outputs of two consecutive cases will be separated by a blank line.

The first line of the output contains the number NP (integer format) of projected segments. It is followed by NP lines of text, defining, each one, a projected segment. These lines must be sorted in ascending order of X values.

A projected segment must be defined by its coordinates X1 and X2, followed by the evaluated percentage of light. All the three values must be in real format, rounded to 3 decimal digits and separated by single spaces. Infinite values must be represented by -inf or +inf.

Sample Input 0

```
1

3
2.0 2.0 9.0 2.0 0.9
13.5 2.0 4.0 8.5 0.7
17.0 10.0 7.0 8.5 0.8
```

Sample Output 0

```
7
-inf 2.000 1.000
2.000 4.000 0.900
4.000 7.000 0.630
7.000 9.000 0.504
9.000 13.500 0.560
13.500 17.000 0.800
17.000 +inf 1.000
```