

6-th Bulgarian National Olympiad in Informatics

April 20 and 23, 1990

Selection round

Theme 2.

Given are N rectangles ($N > 1$), that satisfy the following conditions:

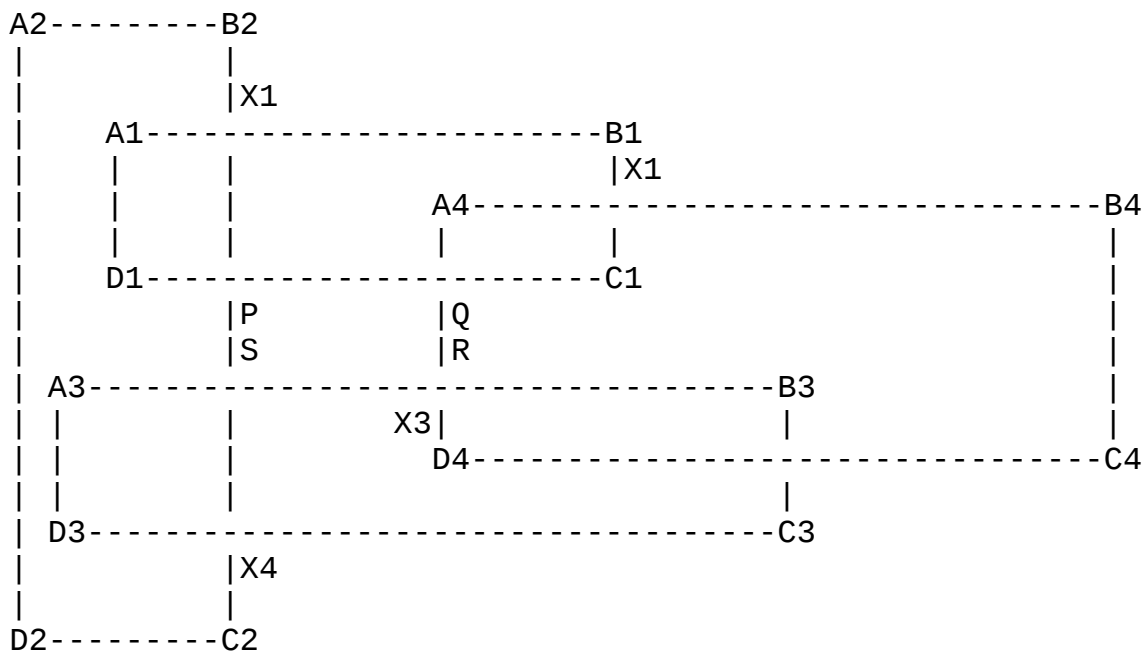
- a) Each of them has sides parallel to the coordinate axes. Each rectangle is specified by two of its vertices, which are the end points of one of its diagonals.
- b) Each rectangle has common internal points to at least one another rectangle. There are no common vertices, sides, or parts of sides, belonging to two or more rectangles.

Write a program for solving the following problems:

Problem 1.

By means of a sequence of points, specify a closed piecewise straight line, that embraces a figure containing the union of all the given rectangles.

An Example:



The union of the rectangles $A_i B_i C_i D_i$ ($i = 1, 2, 3, 4$) is the figure $F = A_2 B_2 X_1 B_1 X_2 B_4 C_4 D_4 X_3 X_4 C_2 D_2$.

The figure F contains only one hole: PQRS.

Problem 2.

Find out whether the figure F contains holes, i.e. closed domains within its boundaries, that are not belonging to it.

Problem 3.

Decompose the figure F into the minimal number of non-intersecting rectangles, every two of them having at most a common side, or parts of sides, so that the union of all these rectangles would be coincide with the figure F .

Problem 4.

Compute the perimeter and the area of the figure F .

Remark:

Solving problems 3 and 4, suppose the figure F has no holes.

Source: Obuchenieto po matematika i informatika, journal published by Bulgarian Ministry of Education, n. 4, 1990, pp. 30-32.

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