National Yang Ming Chiao Tung University
Institute of Electronics & Institute of Pioneer Semiconductor Innovation
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Advanced Algorithms, Spring 2025
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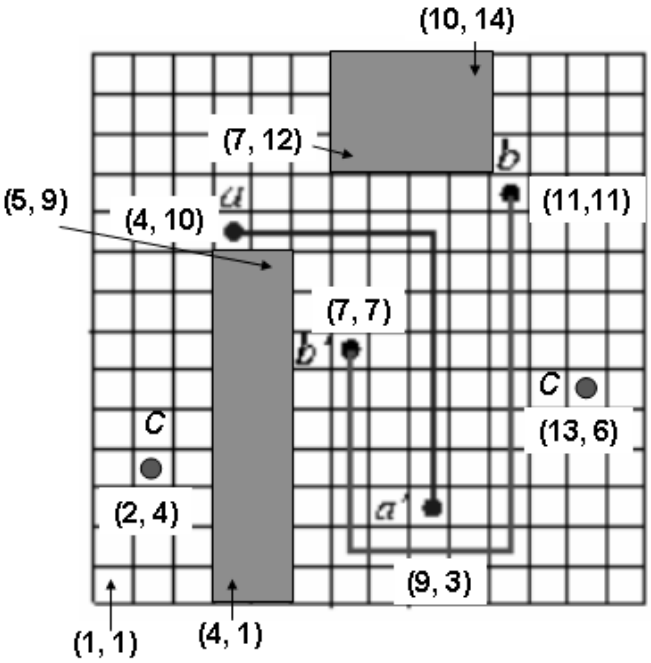
Programming Assignment #2

1 Problem Description

Given a chip, a placement of blockages, and a set of two-pin connections **on a single layer** within the chip, a router finds an interconnection path for each interconnection in the routing area. A chip is specified by its dimension. A blockage is a rectangle and is defined by its bottom-left corner and top-right corner. Each connection is specified by two points in the chip plane. As an example shown in the figure below, the 14 × 14 chip consists of two blockages (shaded regions), < (4, 1), (5, 9) > and < (7, 12), (10, 14) >, and three interconnections a =< (4, 10), (9, 3) >, b=< (7, 7), (11, 11) >, and c =< (2, 4), (13, 6) >. For this problem, you are ask to route as many interconnections as possible **on a single layer**, and each interconnection with the shortest length.



2 Input

The input consists of a line giving the chip dimension, followed by a line starting with "#blockages n", where n denotes the number of blockages, followed by n lines, each containing two 2-tuples, denoting the bottom-left and top-right corner coordinates of a blockage, followed by a line with "#interconnections m", where m denotes the number of interconnections, followed by m lines, each containing two 2-tuples, denoting the starting and ending points of an interconnection. See the sample input below for the example routing instance of the figure.

3 Output

The output first reports the statistics of the routing solution, including the number of interconnections routed, the total interconnection length, the longest interconnection and its length, and the total number of bends. Then, the statistics of each net followed by the route are reported. See the sample output below for the routing solution of the figure.

Sample Input	Output for the Sample Input
14 14 #blockages 2 4 1 5 9 7 12 10 14 #interconnections 3 4 10 9 3 7 7 11 11 2 4 13 6	#interconnections routed = 2 Total interconnection length = 30 The longest interconnection = 2; length = 18 Total number of bends = 3 Interconnection 1: length = 12, #bends = 1 (4, 10), (5, 10), (6, 10), (7, 10), (8, 10), (9, 10), (9, 9), (9, 8), (9, 7), (9, 6), (9, 5), (9, 4), (9, 3) Interconnection 2: length = 18, #bends = 2 (7, 7), (7, 6), (7, 5), (7, 4), (7, 3), (7, 2), (8, 2), (9, 2), (10, 2), (11, 2), (11, 3), (11, 4), (11, 5), (11, 6), (11, 7), (11, 8), (11, 9), (11, 10), (11, 11) Interconnection 3: fails.