CS225 Homework 3

Visibility Problem

For this assignment you will present the discussion and pseudo-code for two algorithms. The algorithms will solve the problems described below in Part 1 and Part 2 of the problem description. Important: Include discussion (explanation) in addition to your pseudo-code.

Deliverables: One MS Word, PDF, or equivalent file that contains two algorithms as described in the problem description below. File naming convention (required!): *yourusername*HW3.docx (or appropriate file extension for your format).

Only electronic documents submitted via Canvas are acceptable. Do not submit a hard copy of your assignment. Do not email your assignment to the course instructor or grader. Important: Late assignments will not be graded.

Problem Description: (Reference figure below) Consider a pair of points, L and R, having coordinates (XL, YL ) and (XR, YR ), respectively. The points may be on opposite sides of a vertical wall, whose top is at (XI, YT ), and bottom is at (XI, YB ). A line drawn from point L to point R may intersect the wall. If intersection occurs, the line will intersect that wall at (XI, YI ). The problem is to determine if two points can “see” each other. Two points on the same side of the wall and always see each other. Two points on opposite sides of the wall can see each other only if the line connecting them does not intersect the wall.

*Part 1:* Create an algorithm that takes two points and one wall as input, returns “True” if the two points can “see” each other, and returns “False” otherwise. Provide discussion plus pseudo-code.

(Hint: YI = YL + (YR - YL) (XB - XL) / (XR - XL).

*Part 2:* Create an algorithm that takes a set of points and one vertical wall as input, and returns a list of every pair of points that can “see” each other. You can choose formats for input and output. For the output, you can choose to return the point identifier or point coordinates. For example, if points 1 and 2 can see each other, your list may contain (P1, P2) or your list may contain ((X1, Y1), (X2, Y2)). Provide discussion plus pseudo-code.

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Rubric: Per that grading rubric below.

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| **Deliverable** | **Points** | **Awarded** |
| Part 1 Discussion | 5 |  |
| Part 1 Pseudo-Code Format/Style | 5 |  |
| Part 1 Pseudo-Code Correctness | 5 |  |
| Part 2 Discussion | 7 |  |
| Part 2 Pseudo-Code Format/Style | 5 |  |
| Part 2 Pseudo-Code Correctness | 8 |  |
| Totals | 35 |  |