
CSCE574 – Robotics

Spring 2014 – Homework 7

Assigned: February 18

Due: February 20

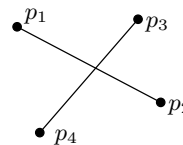
name

Recall the segment intersection problem, in which we are given the endpoints of two line segments $\overline{p_1p_2}$ and $\overline{p_3p_4}$ and we must determine whether or not those two line segments intersect one another. Below are several *possible* algorithms for this problem. They are only “possible algorithms” because they may or may not be correct.

For example, consider the trivial algorithm below. The algorithm is obviously incorrect, and the following segments are a counterexample, because for this input algorithm returns false, but it should return true.

$$\text{SEGINTEXAMPLE}(p_1, p_2, p_3, p_4)$$

$$\text{return false}$$



For each algorithm below, determine whether the algorithm is **correct** or **incorrect**. For each incorrect algorithm, **draw** a counterexample. That is, your answer should be *either* the word “INCORRECT” along with an input for which the algorithm produces an incorrect answer, *or*, write “CORRECT” and explain why the algorithm works.

$$\text{SEGINTA}(p_1, p_2, p_3, p_4)$$

$$\text{return } \text{CW}(p_1, p_2, p_3) \neq \text{CW}(p_1, p_2, p_4)$$

$$\text{SEGINTB}(p_1, p_2, p_3, p_4)$$

$$\text{return } \text{CCW}(p_1, p_2, p_3) \text{ and } \text{CW}(p_1, p_2, p_4) \text{ and } \text{CW}(p_3, p_4, p_1) \neq \text{CW}(p_3, p_4, p_2)$$

$$\text{SEGINTC}(p_1, p_2, p_3, p_4)$$

$$\text{return } \text{CW}(p_1, p_3, p_2) \neq \text{CW}(p_1, p_2, p_4) \text{ and } \text{CW}(p_3, p_4, p_1) \neq \text{CW}(p_3, p_4, p_2)$$

$$\text{SEGINTD}(p_1, p_2, p_3, p_4)$$

$$\text{return } \text{CW}(p_1, p_2, p_3) = \text{CW}(p_1, p_4, p_2) \text{ and } \text{CW}(p_3, p_4, p_1) = \text{CW}(p_3, p_2, p_4)$$