Homework 10

CS 3343 – Fall 2006 assigned November 9, 2006
Tom Bylander, Instructor due November 17, 2006

Your solutions must be submitted as a document to WebCT.

1. (100 pts.) We want to write and analyze a greedy algorithm for the problem of finding the smallest circle that contains a set of (x, y) points.

   (a) (10 pts.) Given the description of a circle, write pseudocode to determine whether a point is contained in the circle.

   (b) (20 pts.) Write pseudocode to find the smallest circle that contains three points. Hint: Look at the answers for Homework 4.

   (c) (20 pts.) Write pseudocode for a greedy algorithm that works as follows:

   - It finds the smallest circle for the first three points. It remembers the circle and the three (or two) points that defined it.
   - For each remaining point P_i, it finds the smallest circle that contains P_i and the three (or two) points that defines the current circle.
   - The final value of the current circle is returned.

   (d) (10 pts.) What is the asymptotic order of your greedy algorithm?

   (e) (20 pts.) Provide an example in which the greedy algorithm fails to find the optimal circle.

   (f) (20 pts.) Suggest and justify changes to the algorithm so that it results in the optimal circle. What will be the order of the modified algorithm?