Arab Academy for Science &Technology and Maritime Transport (AASTMT)
College of Computing and Information Technology (CCIT)
Computing Alg. CS312 – Spring 2014
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Section 6 – April, 6, 2014

Q1.

a. For the one-dimensional version of the closest-pair problem, i.e., for the problem of finding two closest numbers among a given set of n real numbers, design an algorithm that is directly based on the divide-and-conquer technique and determine its efficiency class.

b. Is it a good algorithm for this problem?

Hint:

a. How many points need to be considered in the combining-solutions stage of the algorithm?

b. Design a simpler algorithm in the same efficiency class.

Closest pair divide and conquer algorithm visualization is found in:

http://alvie.algoritmica.org/alvie3/downoads

Q2.

Prove that the divide-and-conquer algorithm for the closest-pair prob- lem examines, for every point p in the vertical strip (see Figures 5.7a and 5.7b), no more than seven other points that can be closer to p than d_{min}; the minimum distance between two points encountered by the algorithm up to that point.

Hint:
Divide the rectangle in Figure 5.7b into eight congruent rectangles and show that each of these rectangles can contain no more than one point of interest.