Data Structures and Algorithms

(a) Describe an efficient algorithm to determine whether two finite line segments in a plane intersect. You may assume that the end points of each line are given as \(x\)-\(y\) coordinates. [8 marks]

(b) Describe in detail an efficient algorithm to find the convex hull of a set of points lying on a plane. Show that the complexity of the Graham scan used in the algorithm is \(O(n)\) and that the algorithm as a whole has complexity \(O(n \log n)\). [8 marks]

(c) Discuss how it is possible to eliminate many of the points before the convex hull algorithm is entered. [4 marks]