# Design and Analysis of Algorithms
# Assignment 1

August 24, 2014

Marks: 30 Due date: September 3, 2014

1. Problem 3-2 from CLRS (page 58)
2. Problem 4.2-5 from CLRS (page 72)
3. Problem 4-4 a,c,f,j from CLRS (page 86)
4. *Binary search:* Suppose we are given an array $A[1 \ldots n]$ with the special property that $A[1] \geq A[2]$ and $A[n-1] \leq A[n]$. We say that an element $A[i]$ is a local minimum if $A[i-1] \geq A[i]$ and $A[i+1] \geq A[i]$. For example, there are six local minima (underlined) in the following array:

   $$9, \underline{7}, 7, 2, \underline{1}, 3, 7, 5, \underline{4}, 7, \underline{3}, \underline{3}, 4, 8, \underline{6}, 9$$

   We can obviously find a local minimum in $O(n)$ time by scanning through the array. Given and analyze an $O(\log n)$ time algorithm for the same.
5. Problem 7-3 from CLRS (pages 161-162)
6. Problem 8.3-4 from CLRS (Your algorithm should use $O(n)$ space.)