CS4104 Fall 2004
Homework Assignment 4
Due: Thursday, September 23 at 11:00 PM

This assignment is worth a total of 50 points.

All homework will be submitted electronically, using the curator system. You may submit your homework in PDF or Postscript form, or in any format that can be opened using Microsoft Word (including plain ASCII text). Note, however, that readability is important to your grade, and that you often need to typeset mathematical equations. If you submit more than one version of your homework, we will store all submissions, but will actually grade the latest one. Make sure that your file contains at the top your name, your ID number, your email address, as well as your partner's name, ID number and email address. All submissions MUST contain the following statement exactly as written here:

I understand the answers that I have submitted. The answers submitted have not been directly copied from another source, but instead are written in my own words.

Two students may work together and jointly submit the homework assignment. If this is done, the submission MUST also contain a statement detailing the contribution of each student to the solution of each problem.

1. Consider a variation on linear search in an unordered array that first checks the middle position of the array. If the element in this position is not equal to the search key, then linear search is called recursively on the lower half (not including the middle position) and the upper half (not including the middle position).

(a) Write a recursive algorithm to implement this version of linear search. Be careful get the computation for the middle element correct, and to pass the bounds correctly on the recursive calls!

(b) Show the recurrence relation for the algorithm. Be sure to show the EXACT values for the size of the subproblems in the recurrence (they are NOT quite $\frac{n}{2}$).

(c) Using your choice of either **substitute and guess** or **guess and test**, find a candidate closed form solution for the recurrence you gave in part (b).

(d) Use induction to prove that your candidate from part (c) is correct.