Assignment 3 - Due: November 5 at 6:45 PM
Please hand it in to me before class as a hard copy.
You can e-mail me a soft copy if you miss class.

Full Name:_____

1- Give the state of the array after each pass when the following numbers (1 to 8) are sorted using the given algorithm.

5   4   7   2   8   3   1   6

The first pass has been done for you to get you started. The last pass should have the array in sorted order.

a) Selection sort

1   4   7   2   8   3   5   6   // pass 1

b) Insertion sort

4   5   7   2   8   3   1   6   // pass 1

2- We are using merge sort to sort the following numbers (1 to 16)

13 9   11 2   7   15   10   4   16 5   1   8   12   6   3   14

This diagram from Wikipedia http://en.wikipedia.org/wiki/File:Merge_sort_algorithm_diagram.svg gives a good idea of the algorithm, but it might give the wrong impression of the order the merge operations happen as the recursion progresses since it might seem the merges happen in parallel. Provide below the merges in the correct order together with the state of the array. The last merge should have the whole array sorted. The first two have been given below to get you started.

<u>9   13</u> 11 2   7   15   10   4   16 5   1   8   12   6   3   14   // merge 1
9   13 <u>2   11</u> 7   15   10   4   16 5   1   8   12   6   3   14   // merge 2

3- We are using quicksort to sort the following numbers (1 to 16)

14 9 11 2 7 15 10 4 16 5 1 8 12 6 3 13

As we saw in class all the work in quicksort is done as part of the partition method. We used as a pivot the first element of the subarray (assume array was already shuffled randomly). Using the partition algorithm we saw in class that keeps two indexes "lo" (after the pivot) and "hi" (at the end of the array) which progress toward each other and swap elements as necessary to keep the ones smaller than the pivot to the left and the ones larger to the right, the first partition has been done below which puts element 14 in its final position.

6 9 11 2 7 13 10 4 3 5 1 8 12 **14** 16 15

a) Perform the next partition (the left subarray (elements 6 to 12) pivoting around the first element (6)) and show below the state of **the whole array** when that partition is complete. **Circle the two elements that are now in their final position.**

One line here showing the state of the array with 2 elements circled:

4 1 5 2 3 (6) 10 13 7 11 9 8 12 (14) 16 15

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b) Given another array as below, perform the first partition around the first element.

9 11 2 7 15 10 4 16 5 14 1 8 12 6 3 13

One line here showing the state of the array with 1 element circled:

5 3 2 7 6 8 4 1 (9) 14 16 10 12 15 11 13

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