ASSIGNMENT 1:
Assigned: 09/22/14 Due: 10/1/14 (submit via moodle if you want)

Problem 1. (10 points)
Show the consecutive steps of the insertion sort, mergesort, and quicksort when the input sequence
is < 8, 9, 7, 2, 5, 4, 1, 3, 6, 4 >. You should show the exchanges of elements, the pivots (if pivots are
used), and the modifications of the sequence.

Problem 2. (20 points)
Read carefully the description of the counting sort from the book of Cormen et al. Transfer this
pseudocode to Java/Python/C++. Hand in the code and the intermediate and final results of the
algorithm when it is applied to the input sequence < 7, 1, 3, 1, 2, 4, 5, 7, 2, 4, 3 >. Your program should
accept as inputs the number of elements in the sequence, the sequence itself, and the integer k. Add
comments that explain your code. Do not copy code from the internet.

Problem 3. (5 points)
Illustrate the operation of Bucket-sort on the array < .78, .13, .16, .62, .39, .20, .89, .53, .71, .42 >.

Problem 4. (25 points)
You are given two arrays Array 1 and Array 2, each containing N integers sorted in nondecreasing
order. Give an O(log N)-time algorithm to compute the median of these 2N integers. Describe your
algorithm and write some pseudocode and code that does this. Hand in the pseudocode, the
real code (Java/Python/C++), and the intermediate and final results of the algorithm when it is applied
to two arrays of your preference. Do not copy code from the internet.

Problem 5. (5 points)
Is the sequence < 19, 15, 14, 6, 13, 10, 2, 5, 7, 12 > a heap? Please explain.

Problem 6. (5 points)
Is an array that is in reverse (decreasing) sorted order a heap? Please explain.