## COMP20012 Tutorial 4: Sorting Algorithms

1. Sort the sequence $8,1,4,1,5,9,2,6,5$ by using
a) Insertion sort
b) Mergesort
c) Quicksort, with the middle element as pivot
2. An array contains $N$ numbers and you want to determine whether two of the numbers sum to a given number $K$. For example, if the input is $8,4,1,6$ and $K$ is 10 , the answer is yes ( 4 and 6). A number may be used twice.
a) Give an $O\left(N^{2}\right)$ algorithm to solve this problem
b) Give an $O(N \log N)$ algorithm to solve this problem. (Hint: first sort the array and then solve the problem in linear time.)
3. Investigate the details of the Shell sort algorithm, either from a textbook or by finding a suitable web resource.

Explain to your tutor how this algorithm works, illustrating your answer by sorting the array in question 1 , using the increment sequence $5,3,1$.

