**Exercise 2. Answer Sheet**

Student's Name: Tsuyoshi Kumamoto Student's ID:s1250050

***Problem 1.*** *(10 points)* Consider a priority queue S implemented as a heap. Write a pseudo-code for the **Maximum(S)** operation on this priority queue.

Put your answer here.

Def MaxHeapify (A,i)

L = LEFT(i)

R = RIGHT(i)

If L<=A.heap\_size and A[L] > A[i]

Largest = L

else

Largest = i

If R<=A.heap\_size and A[R]>A[largest]

Largest = R

If Largest ≠i

swap(A[i], A[Largest])

MaxHeapify(A, Largest)

Def HeapBottomUP(A)

A.heap\_size = A.length

For I = (A.length / 2) to 1

MaxHeapify (A,i)\

***Problem 2.*** *(20 points)*Consider top-down heap construction approach.

a). Write a pseudo-code for a **HeapTopDown(A)** algorithm using **Max-Heap-Insert (A, key)** operation

Put your answer here.

b) What is the time complexity of **HeapTopDown(A)** algorithm? Why?

Put your answer here.

***Problem 3.*** *(20 points)*Illustrate the operation **Heap-Extract-Max** on a heap A=[15,13,9,5,12,8,7,4,0,6]

Put your answer here.

***Problem 4.*** *(50 points)*Write a program implementing **HeapBottomUp (A)** algorithm. Upload your source code. Show your input array and the output heap in the space below.

Put your answer here.