DATA STRUCTURES AND ALGORITHMS

Periodic examination – The 1st test
Time: 120 minutes

Question 1.

Write a recursive function printing out the following strings:

a. ***(1.0 point)***

N = 3

```
*  *  *
   *  *
      *
```

N=6

```
*  *  *  *  *  *
   *  *  *  *  *
      *  *  *  *
         *  *  *
            *  *
               *
```

b. ***(1.0 point)***

N = 3

```
*  *  1
*  2  1
3  2  1
```

N=6

```
*  *  *  *  *  1
*  *  *  *  2  1
*  *  *  3  2  1
*  *  4  3  2  1
*  5  4  3  2  1
6  5  4  3  2  1
```

Question 2.

a. ***(1.5 point)***

Write a program/function inserting a new node into a singly linked list at the i^{th} position (The first node is 1^{st} position).

b. ***(1.5 point)***

Write a program/function deleting a node at the i^{th} position in a singly linked list (The first node is 1^{st} position).

Question 3. ***(3.0 point)***

Give the declaration:

```
struct stack{
   node *top;
   int count; // The Number of elements in a stack
   int capacity;  // Maximum number of elements in a stack
}
```

Write some functions operating a queue: isEmptyStack, isFullStack, PopStack, PushStack.

Question 4.

a. ***(1 point)***

Write a function reversing a singly linked list by using only stack and operations on the stack.

b. ***(1 point)***

Write a function that reversing a singly linked list by using only queue and operations on the queue.

Requiments:

1. Student saves files by following format: **[Stu_ID]question_*number_character*.cpp** for storing and post audits *(Ex: [1611234]question_1_a.cpp, [1611234]question_2_b.cpp)*. Store those files in a *Stu_ID* named folder, then compress it into *Stu_ID.zip* file. Only submit the compressed file.
2. Student writes main coding segments on the papers. Your works will be marked in papers.
3. Copy act is prohibited. The detected copy will get zero point in total.
4. The compressed file must be submitted to class president **by 13th Oct, 2017**.
5. The class president must submit all of the compressed files to teacher **by 15th Oct, 2017**.

--- END ---