**Fall 2024 CS311 DSA Homework 2**

**Your Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Univ. ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Instructions**

* Check **due date** and polices on course webpage.
* Write the answer for each question in the space provided below the question.
* Submit your answers to cs\_scu@foxmail.com.
* Submission file name format: CS311\_assignmentID\_yourID\_yourName.doc (or pdf).

1. (10 points) What is the result of the recursive function printStuff(2)?

 static void printStuff(int level) {

 if (level == 0) {

 System.out.print("\*");

 }

 else {

 System.out.print("{");

 printStuff(level - 1);

 System.out.print("/");

 printStuff(level - 1);

 System.out.println("}");

 }

 }

a. {{\*/\*}{\*/\*}}

b. {\*/\*}/{\*/\*}

c. {{\*/\*}/{\*/\*}}

d. {{\*/\*/\*/\*}}

***Answer***:

2. (10 points) Calculate the following Postfix expressions (Support the detail of each step):

1. 78+
2. 57+67+\*
3. 452\*+5+
4. 456\*+
5. 34\*24+/54+\*

***Answer***:

3. (20 points) Merge 2 sorted linked lists and return it as one sorted list.

1. Write at least TWO methods using C++. (Recommend to comment your code.)
2. Analyze and describe their time complexity.

Example of two sorted linked-lists:

[

 1->4->7->9->10,

 5->6->8

]

***Answer*:**

Method 1:

Method 2:

...

4. (10 points) Write a C++ to merge *k* sorted linked lists and return it as one sorted list. Analyze and describe its complexity. (Recommend to comment your code.)

**Example**:

Input: lists = [[1,4,5], [1,3,4], [2,6]]

Output: [1,1,2,3,4,4,5,6]

Explanation: The linked-lists are:

[

1->4->5,

1->3->4,

2->6

]

Merging them into one sorted list:

1->1->2->3->4->4->5->6

***Answer*:**

5. (30 points) Palindrome: A string reads the same forwards and backwards.

Example: "eye" is a palindrome; "abba" is a palindrome; "leaf" is not.

1. Write C++ using a **list**.
2. Write C++ using a **stack**.
3. Write C++ using a **stack** and a **queue**.

*Hint*: Consider the length of the string is odd or even. Recommend to comment your code.

***Answer:***

6. (20 points) Suppose the towers of Hanoi puzzle has three poles and *n* rings, write C++ to solve the Hanoi problem using a **stack**. (Recommend to comment your code.)

***Answer*:**