Problem Solving Steps

Program Assignment #5

**Problem #1**

* (35 points) A stack data structure has following functionalities like empty(), size(), top(), push() and pop(). See the lecture slides for the details (how it works, complexity, etc.) I have shown you in the class how to implement a stack using a list data structure. You need to implement the stack with Linked List data structure in python. Implement the stack means, all of the stack functionalities including the construction of stacks should present on your code.

1. **State the required output:**

* No required output, printing to the console

1. **State the necessary input items:**

* Menu to allow the user to push, pop, check data.

1. **State the formulas necessary:**

* No formulas required for this problem.

1. **List the steps in order:**

* Implement Node struct/class
* Implement a Struct class
* Add methods get\_top, get\_size, push, pop and is\_empty,

**Problem #2**

* (30 points) Given the expression as string str, find the duplicate parenthesis from the expression. Your program will output whether or not finding the duplicates, that is true of false.

1. **State the required output:**

* Print True or False to the screen

1. **State the necessary input items:**

* Input file
* Added with program: input.dat

1. **State the formulas necessary:**

* No formulas, just an algorithm to process a string to find duplicate pairs of parentheses

1. **List the steps in order:**

* Ask user for input file
* Pass the string(s) read from a file to a method
  + The method will process the text to try to find duplicate parentheses
  + Method will return either True or False when duplicates are found
* Print the value found from the method to the screen

**Problem #3**

* (35 points) Write a python code to find the average from a stream. The input of this program will receive a stream of numbers and a window size to find the moving average of all the numbers in the sliding window. Write your code in OOP style and solve the program with queue and or stack data structure.

1. **State the required output:**

* Print to console.

1. **State the necessary input items:**

* No required input, allowing user to fill in the needed input.

1. **State the formulas necessary:**

* Average formulas: sum of number / count of numbers

1. **List the steps in order:**

* Create a stack using a List
* Ask user for inputs
* Push numbers to be averaged to the stack
* Find the average of numbers falling within the user defined window
* Print stack and average stack to the console