CSCE 3110 Assignment 2

(Due on Oct 6, 11:59PM)

1. (20 points) Linked lists and arrays:

   a. What are some advantages of linked lists versus arrays?
   b. What are some advantages of arrays versus linked lists?

2. (20 points) Suppose a method receives a List<Integer> and reverses the order of the items it contains by removing each item from the front of the list and pushing it onto a Stack<Integer>, and then popping the items from the stack and inserting each item to the end of the list.

   What is the expected Big-O running time if:
   a. If an ArrayList is passed. Explain your answer.
   b. If a LinkedList is passed. Explain your answer.

3. (20 points) Write a program void reverse_list(list **head)in pseudo-code or C++ to reverse the direction of a given singly-linked list. In other words, after the reversal all pointers should now point backwards. Your algorithm should take linear time. The node of this singly-linked list is defined as

```
typedef struct list {
  item_type item;
  struct list * next ;
}list;
```

4. (20 points) . Show each step of converting a+b*c+(d-e) from infix to postfix notation, using the algorithm described in the lecture that uses a stack.

5. (20 points) Write a function bool isBalanced(const std::string& expr) that checks whether a given expression containing parentheses (), curly braces {}, and square brackets [] is balanced. An expression is considered balanced if every opening bracket has a corresponding closing bracket, and the pairs of brackets are properly nested.

   What is the time complexity of the isBalanced function? Explain your answer.

   For example:

- isBalanced("(){}[]") should return true
- isBalanced("([{}])") should return true
- isBalanced("(]") should return false
- isBalanced("([)]") should return false