Examination in Programming Proficiency (EPP) Part I

- The exam is **open textbook, open notes.**
- **Internet access is allowed to look up reference material but not for copy&paste of any existing solution (e.g., from chegg.com, coursehero.com)**. This will be considered academic dishonesty
- Collaboration with anyone is not allowed (this will be considered academic dishonesty).
- You might find yourself under some time pressure in this examination. Please check the point value for each problem so that you do not spend more time on one problem than it is worth.
- Please make sure to read each problem carefully before working on it.

IMPORTANT:

- **Starter code is given to you on Titanium**
- Upload ONLY your C++ files (.cpp, .h) to Titanium.

Problem 1

You are to write two functions, `printString()` and `testString()`, which are called from the given main function.
`printString (string)` prints characters to std::cout with a space after every character and a newline at the end.
`testString (string)` returns true if the string contains two consecutive characters that are the same, false otherwise. See the main() to see how the two functions are called.

Some sample runs are given below (the main has more example):
string: "hello"
printString prints: `h e l l o`
testString returns: true

string: "world"
printString prints: `w o r l d`
testString returns: false

string: "hello world"
printString prints: `h e l l o   w o r l d`
testString returns: true

- • Write only the two functions in the space provided.
- • You can change the main function for your own testing. Your code will be tested with a similar main function.
- • Do not change the name of the given file (it should remain prob1.cpp)

Hint:
You can access the *i*-th character of a string s with s[i].
The number of characters in the string is s.size().

File submission: Upload prob1.cpp with the two functions to Titanium

Command to compile and run on Linux/Tuffix (RECOMMENDED):

```
clang++ -std=c++17 prob2.cpp IntegerLinkedList.cpp
./a.out
```

Problem 2

You are given the partial implementation of `class IntegerLinkedList` which stores integers in a singly linked list. Add a public member function that does the following:

- `bool checkList()`: returns true if two consecutive integers in the linked list are equal, false otherwise. You may assume that the list is not empty.

For example, `checkList()` should return true for the the linked list shown below. A main function (prob2.cpp) is given to you to add data values to the linked list and test your function. Other examples are given in the main function.

head

```
23 → 45 → 45 → 20 → 15 NULL
```
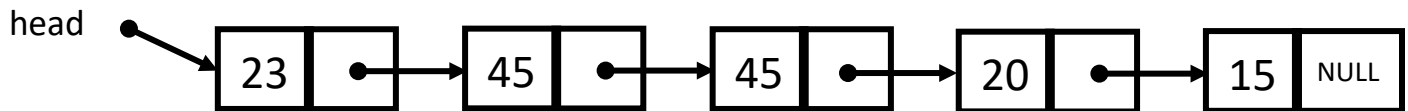
- You must implement all your code in the given cpp file called `IntegerLinkedList.cpp`
- You cannot add other member variables and functions to class `IntegerLinkedList`.
- You can change the main function for your own testing. Your code will be tested with a similar main function.

File submission: Upload exactly one file:
  1. `IntegerLinkedList.cpp`

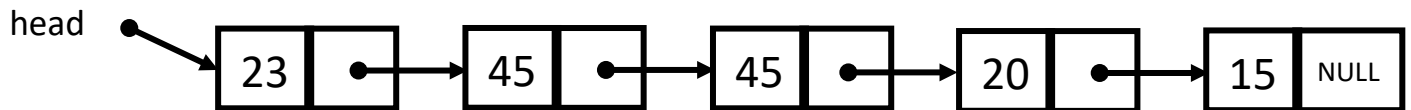**Command to compile and run on Linux/Tuffix (RECOMMENDED):**

```
clang++ -std=c++17 prob2.cpp IntegerLinkedList.cpp
./a.out
```

Problem 3

Add a **recursive** Boolean function called `checkRecurse` to `class IntegerLinkedList` to check if two consecutive integers in the linked list are equal. You may assume that the list is not empty.

A recursion "helper" function is already included in `class IntegerLinkedList.` You only need to write the recursive function.
For example, `checkRecurseHelper` should return true for the linked list shown below. A main function (prob3.cpp) is given to you to add data values to the linked list and test your function. Other examples are given in the main function.

head

| 23 | → | 45 | → | 45 | → | 20 | → | 15 | NULL |

- **A non-recursive version of the function will get no credit.** The function should not have any loops at all. Do **not** use any global variables. Do not add member variables to the class. Do not change the contents of the linked list.
- Write only the recursive function in IntegerLinkedList.cpp.
- You can change the main function for your own testing. Your code will be tested with a similar main function.

File submission: Upload exactly one file to Titanium:
> 1. `IntegerLinkedList.cpp`

Command to compile and run on Linux/Tuffix (RECOMMENDED):

```
clang++ -std=c++17 prob3.cpp IntegerLinkedList.cpp
./a.out
```