

**CSC 228-01 Data Structures and Algorithms, Fall 2019**  
**Instructor: Dr. Natarajan Meghanathan**

**Quiz 1: Design and Implementation of an Algorithm to Determine whether a Linked List has Unique Elements**

**Due by: Sept. 17th, 11.59 PM**

In this quiz, you will design and implement an algorithm to determine whether a singly linked list has unique elements or not. The list is said to be unique if every element in the list appears exactly once. The list is said to be not unique if at least one element in the list appears more than once.

For example:

the linked list 34 --> 23 --> 90 --> 12 --> 45 is unique; whereas,  
the linked list 34 --> 23 --> 90 --> 23 --> 45 is not unique, as the element 23 appears more than once.

You are given the code for the Singly Linked List-based implementation of the List ADT. There is no need to make any changes to the main( ) function. The List class has a function isUnique( ) that returns a boolean (true: if the list has unique elements and false: if at least one element in the list appears more than once).

**Submission:**

- (1 - 50 pts) Submit the entire code (including the implementation of the isUnique( ) function) as a separate file.
- (2) Submit the following items, put together as a single PDF file.
  - (i - 20 pts) Pseudo code of your algorithm and a brief explanation of your logic/idea to determine whether a list has unique elements or not.
  - (ii - 20 pts) The overall time complexity analysis of your algorithm. Make sure to explain the best case and worst case scenarios along with the number of times the basic operation is executed in each case.
  - (iii - 5 pts) Screenshot of the execution of the code, wherein you input the data for a list of 10 integers such that the each integer appears exactly once, and the output should be that the list has unique elements.
  - (iv - 5 pts) Screenshot of the execution of the code, wherein you input the data for a list of 10 integers such that at least one integer appears more than once, and the output should be that the list does not have unique elements.