2021 Winter CIS200 – Programming Assignment 3

Pointers and Linked Lists

Professor: Jie Shen

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Due date: Mar. 27, 2021

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Contents

[**Question 1 Unsorted Linked List (30 points)** 3](#_Toc67951089)

[Source code (USED C++ COMPILER on Microsoft Windows 10) 3](#_Toc67951090)

[Test data and expected results 3](#_Toc67951091)

[TEST 1: 4](#_Toc67951092)

[TEST 2: 4](#_Toc67951093)

[TEST 3: 5](#_Toc67951094)

[TEST 4: 5](#_Toc67951095)

[TEST 5: 6](#_Toc67951096)

[**Question 2 Sorted linked list 30 points)** 7](#_Toc67951097)

[Source code (USED C++ COMPILER on Microsoft Windows 10) 7](#_Toc67951098)

[Test data and expected results 7](#_Toc67951099)

[TEST 1: 8](#_Toc67951100)

[TEST 2: 8](#_Toc67951101)

[TEST 3: 9](#_Toc67951102)

[TEST 4: 9](#_Toc67951103)

[TEST 5: 10](#_Toc67951104)

[**Question 3 Sorted list using Dynamic Array (30 points)** 11](#_Toc67951105)

[Source code (USED C++ COMPILER on Microsoft Windows 10) 11](#_Toc67951106)

[Test data and expected results 11](#_Toc67951107)

[TEST 1: 12](#_Toc67951108)

[TEST 2: 12](#_Toc67951109)

[TEST 3: 13](#_Toc67951110)

[TEST 4: 13](#_Toc67951111)

[TEST 5: 14](#_Toc67951112)

# **Question 1 Unsorted Linked List (30 points)**

## Source code (USED C++ COMPILER on Microsoft Windows 10)

See CPP and H uploads I made in canvas with this document along with the executables.

## Test data and expected results

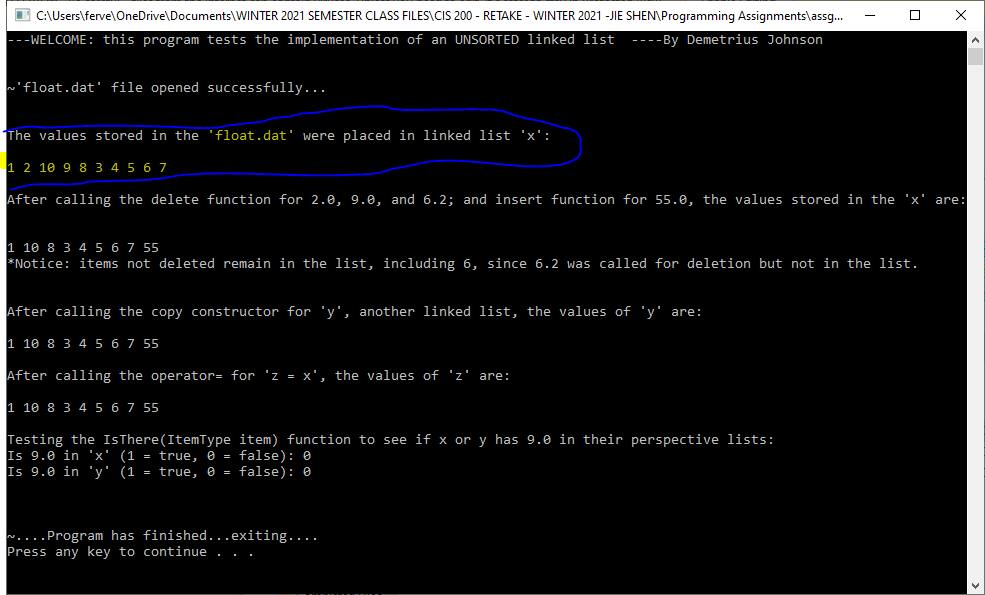
Test Table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test # | Valid / Invalid Data | Description of test | Input Value | Expected Output | Actual Output | Test Pass / Fail |
| 1 | valid | Task 2 | Float.dat | Output contents in a list from float.dat file | See screenshot | pass |
| 2 | valid | Task 3: Add code to your driver to test the remaining member functions. Delete 2.0, 9.0, and 6.2 from *x* and print the list to be sure they are gone. Bonus: Insert function tested for 55  Although it was already tested from file input | Delete 2.0, 9.0, and 6.2 from *x*  *Insert 55.0 to x* | Output contents of x excluding 2, and 9, and adding 55 | See screenshot | pass |
| 3 | valid | Task 4: Create another instance, y, through the copy constructor such that the content of *y* is the same as that of *x*, but a deep copy should be done. Print out the all the list elements of *y*. | UList<ItemType> y(x); | Contents of y is same as x | See screenshot | pass |
| 4 | valid | Task 5: Declare an instance, z, and assign the content of x to z through the operation “=”. Print out the all the list elements of z. | UList<ItemType> z;  z = x; | Contents of z is same as x | See screenshot | pass |
| 5 | valid | Task 6: Test if 9.0 is in the lists *x* and *y* via the member function: IsThere(ItemType item) and print out the test results. | Isthere 9 for x and y | False for both | See screenshot | pass |

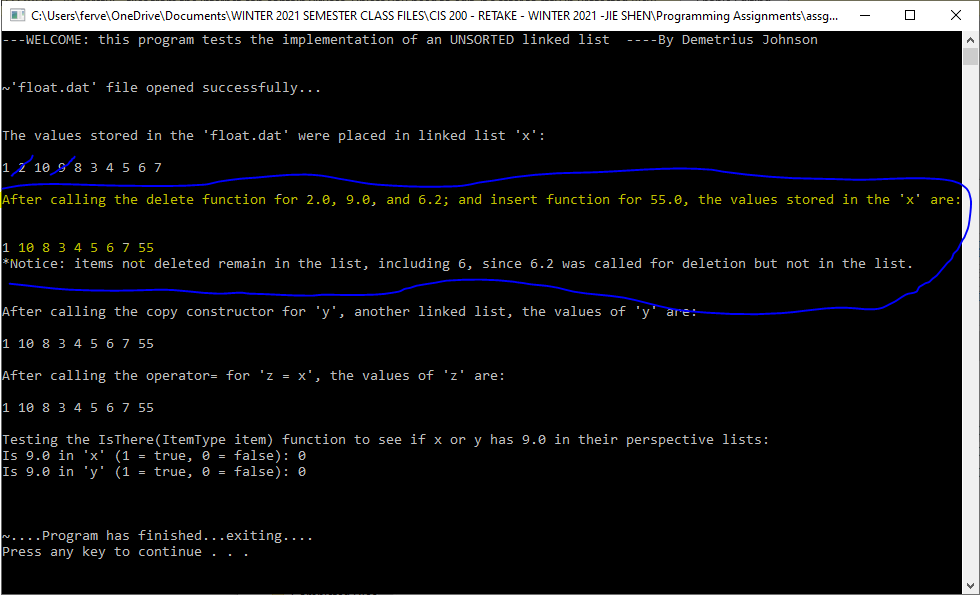
Task 7: What is the Big-O notation for the time complexity of IsThere( ) function?

answer: O(N) since I only implemented 1 while loop in my function that searches from the first node to the last node in the linked list.

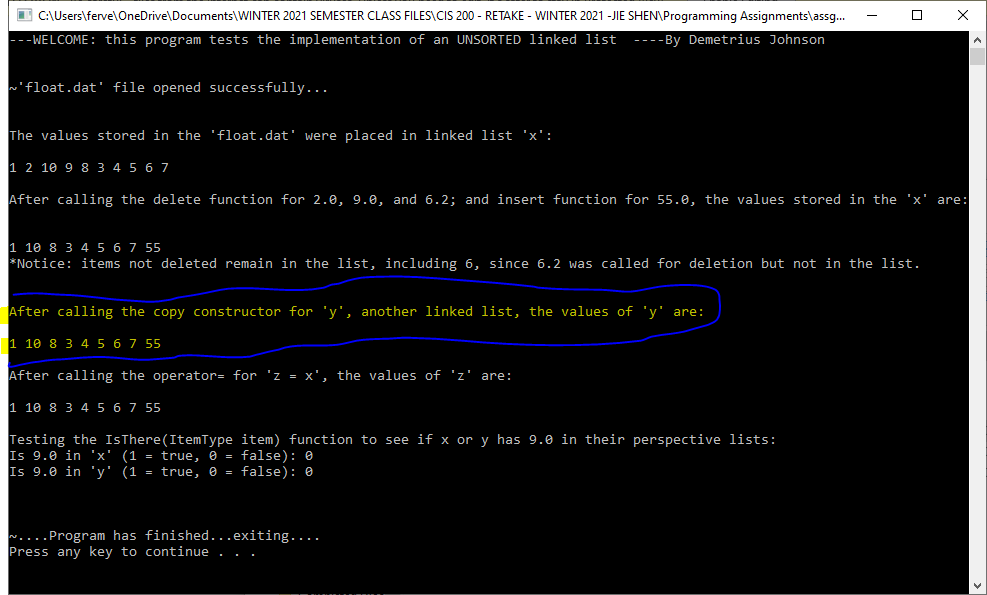
### TEST 1:



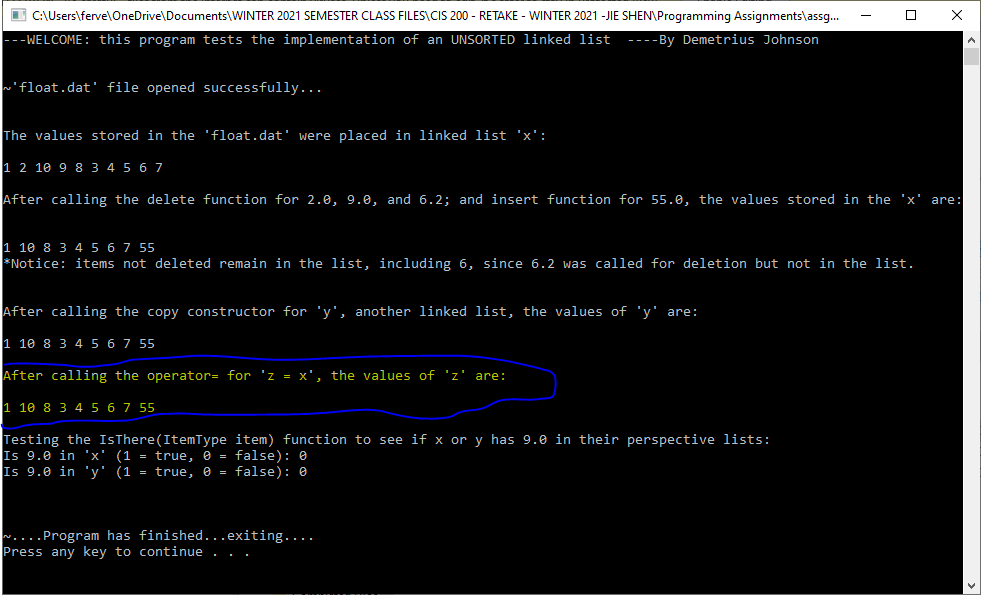
### TEST 2:



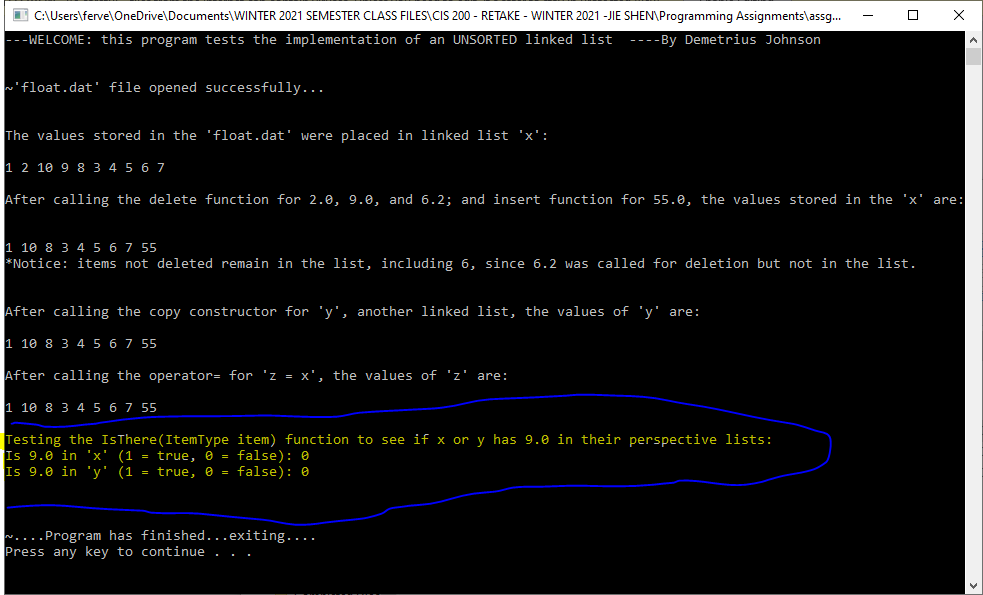
### TEST 3:



### TEST 4:



### TEST 5:



# **Question 2 Sorted linked list 30 points)**

## Source code (USED C++ COMPILER on Microsoft Windows 10)

See CPP and H uploads I made in canvas with this document along with the executables

## Test data and expected results

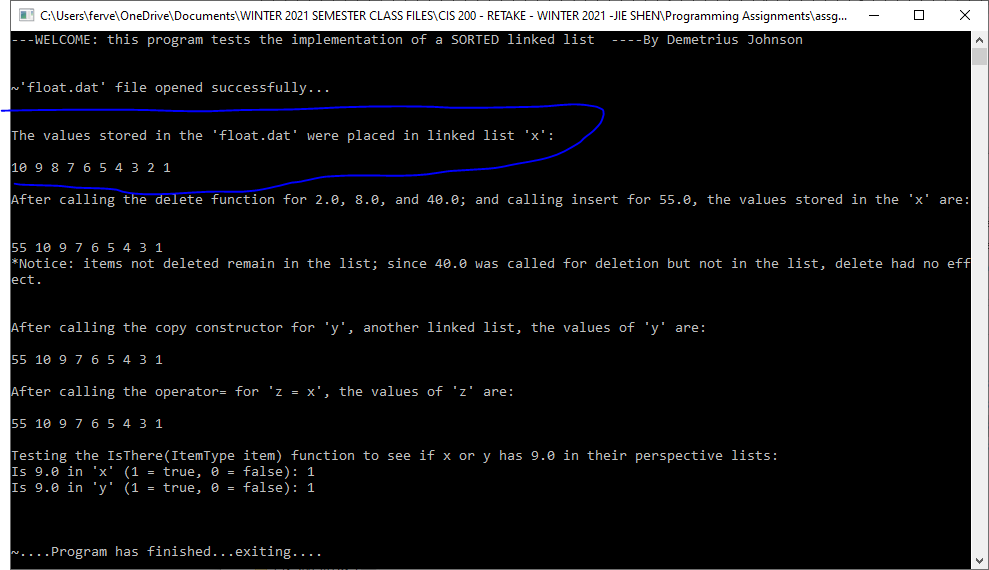
Test Table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test # | Valid / Invalid Data | Description of test | Input Value | Expected Output | Actual Output | Test Pass / Fail |
| 1 | valid | Task 2 | Float.dat | Output contents in a list from float.dat file in SORTED order | See screenshot | pass |
| 2 | valid | Task 3: Add code to your driver to test the remaining member functions. Delete 2.0, 8.0, and 40 from *x* and print the list to be sure they are gone. Bonus: Insert function tested for 55  Although it was already tested from file input | Delete 2.0, 8.0, and 40.0 from *x*  *Insert 55.0 to x* | Output contents of x excluding 2, and 8, and adding 55 | See screenshot | pass |
| 3 | valid | Task 4: Create another instance, y, through the copy constructor such that the content of *y* is the same as that of *x*, but a deep copy should be done. Print out the all the list elements of *y*. | UList<ItemType> y(x); | Contents of y is same as x | See screenshot | pass |
| 4 | valid | Task 5: Declare an instance, z, and assign the content of x to z through the operation “=”. Print out the all the list elements of z. | UList<ItemType> z;  z = x; | Contents of z is same as x | See screenshot | pass |
| 5 | valid | Task 6: Test if 9.0 is in the lists *x* and *y* via the member function: IsThere(ItemType item) and print out the test results. | Isthere 9 for x and y | TRUE for both | See screenshot | pass |

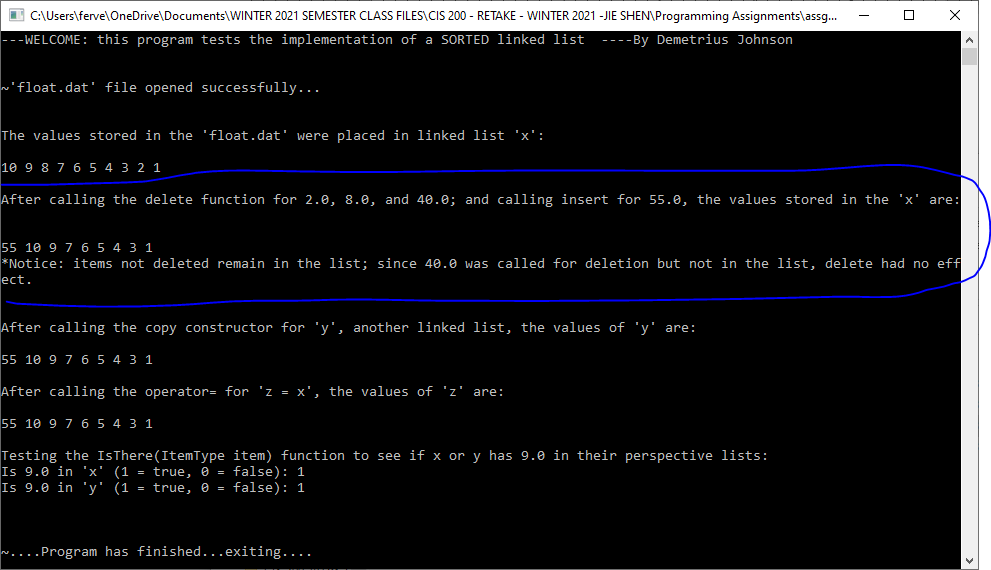
Task 7: What is the Big-O notation for the time complexity of IsThere( ) function?

answer: O(N) since I only implemented 1 while loop in my function that searches from the first node to the last node in the linked list.

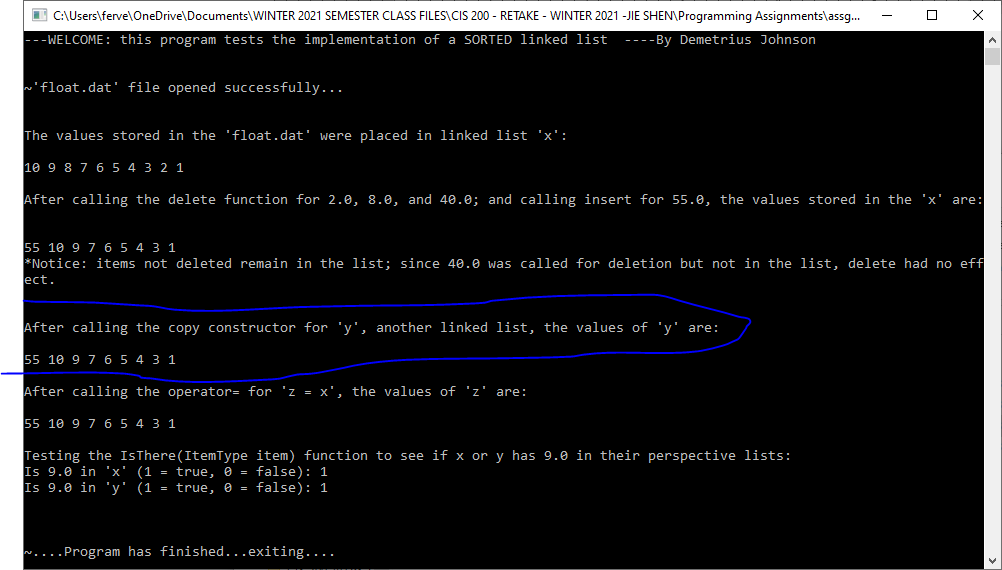
### TEST 1:



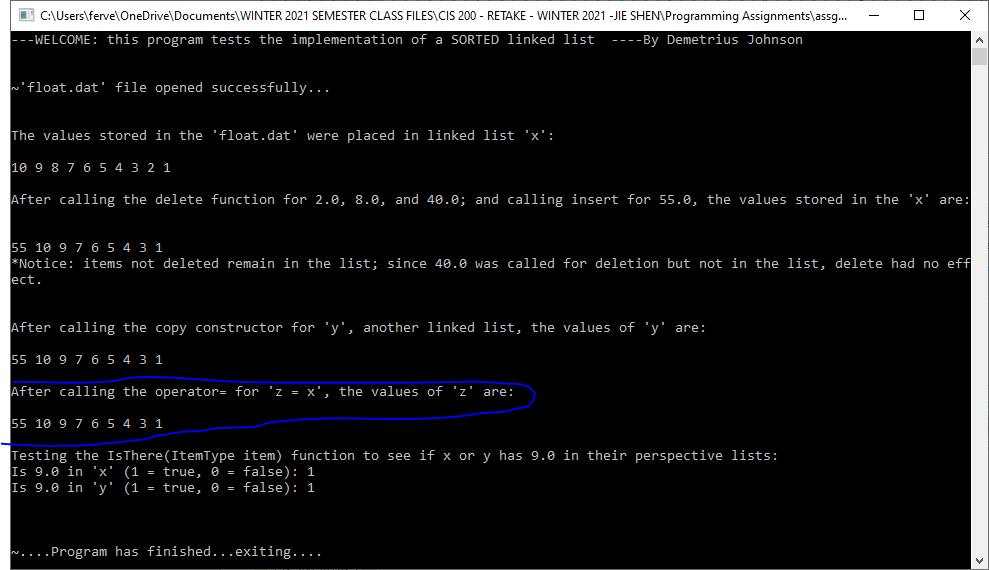
### TEST 2:



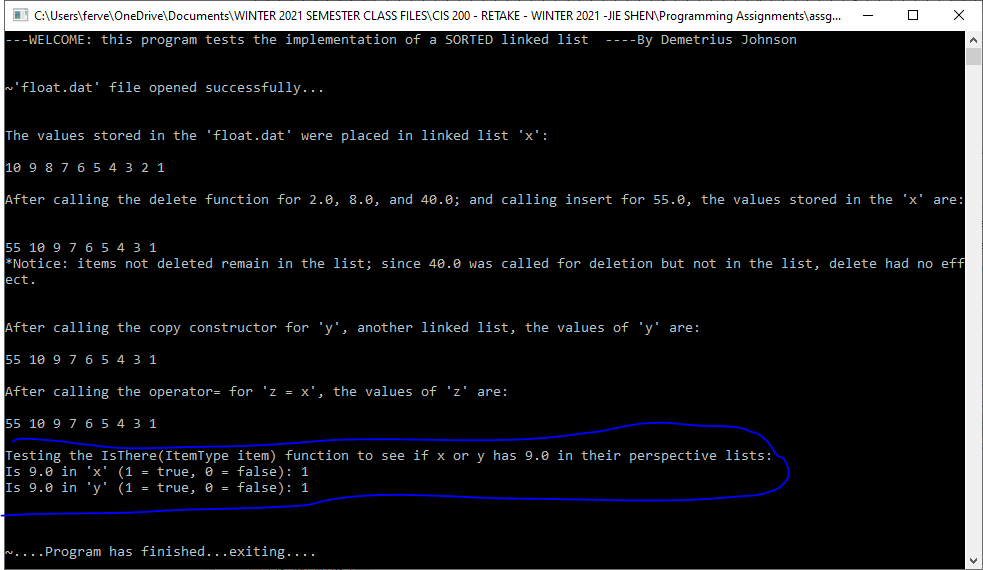
### TEST 3:



### TEST 4:



### TEST 5:



# **Question 3 Sorted list using Dynamic Array (30 points)**

## Source code (USED C++ COMPILER on Microsoft Windows 10)

See CPP and H uploads I made in canvas with this document along with the executables

## Test data and expected results

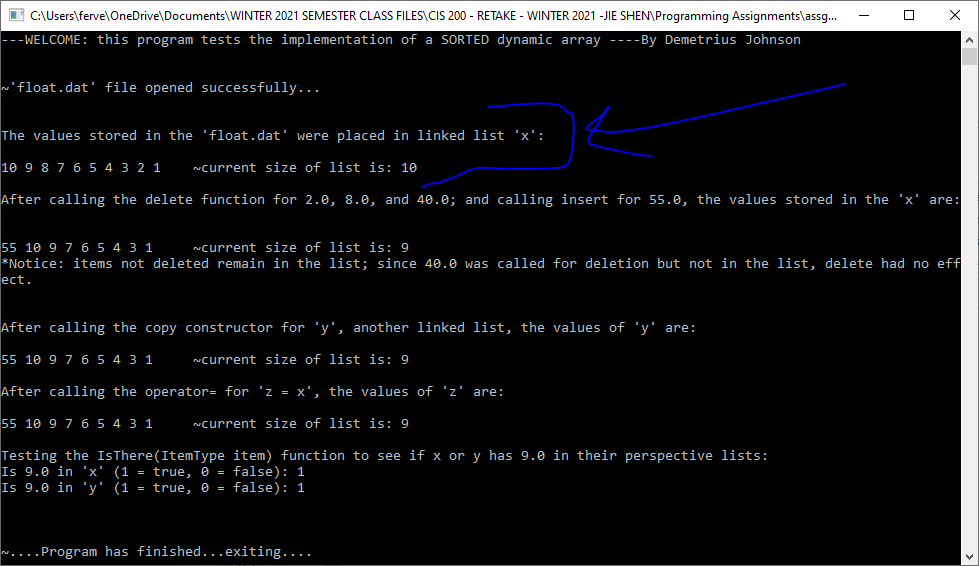
Test Table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test # | Valid / Invalid Data | Description of test | Input Value | Expected Output | Actual Output | Test Pass / Fail |
| 1 | valid | Task 2; also test Length() | Float.dat | Output contents in a list from float.dat file in SORTED order | See screenshot | pass |
| 2 | valid | Task 3: Add code to your driver to test the remaining member functions. Delete 2.0, 8.0, and 40 from *x* and print the list to be sure they are gone. Bonus: Insert function tested for 55  Although it was already tested from file input | Delete 2.0, 8.0, and 40.0 from *x*  *Insert 55.0 to x* | Output contents of x excluding 2, and 8, and adding 55 | See screenshot | pass |
| 3 | valid | Task 4: Create another instance, y, through the copy constructor such that the content of *y* is the same as that of *x*, but a deep copy should be done. Print out the all the list elements of *y*. | UList<ItemType> y(x); | Contents of y is same as x | See screenshot | pass |
| 4 | valid | Task 5: Declare an instance, z, and assign the content of x to z through the operation “=”. Print out the all the list elements of z. | UList<ItemType> z;  z = x; | Contents of z is same as x | See screenshot | pass |
| 5 | valid | Task 6: Test if 9.0 is in the lists *x* and *y* via the member function: IsThere(ItemType item) and print out the test results. | Isthere 9 for x and y | TRUE for both | See screenshot | pass |

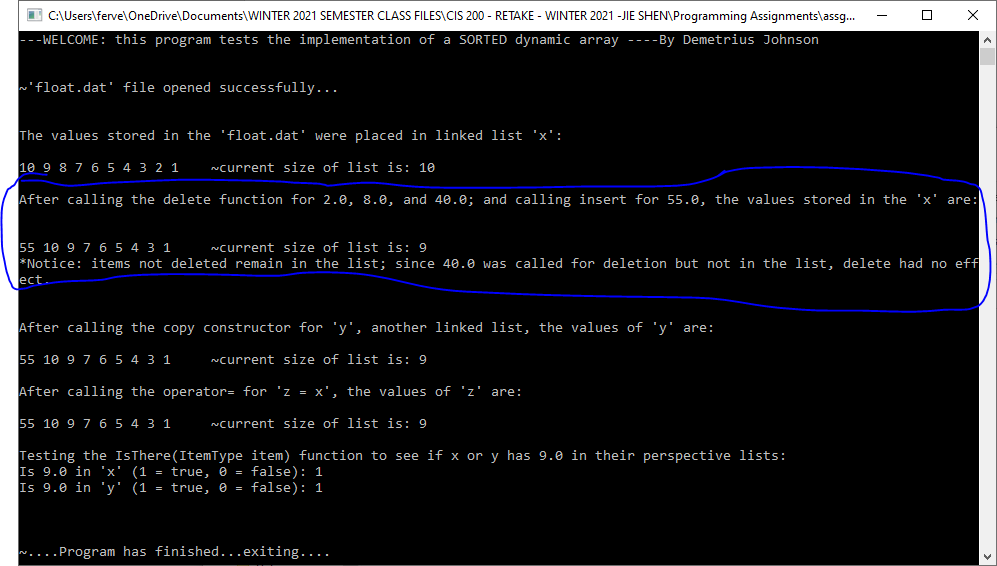
Task 7: What is the Big-O notation for the time complexity of IsThere( ) function?

answer: O(N^2) since in the while loop, every element has to be shifted down as well depending on N in another loop; total loops = 2; N^2 time complexity.

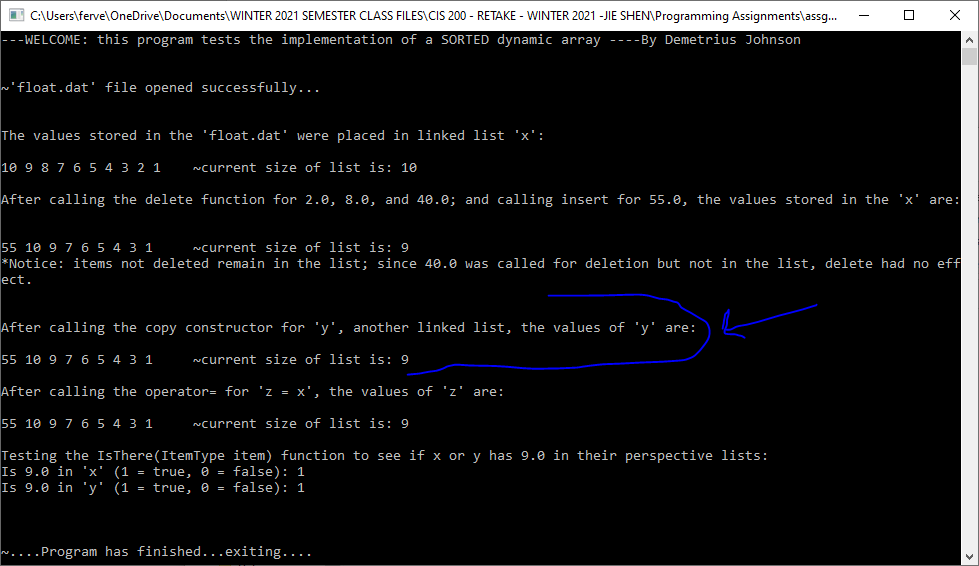
### TEST 1:



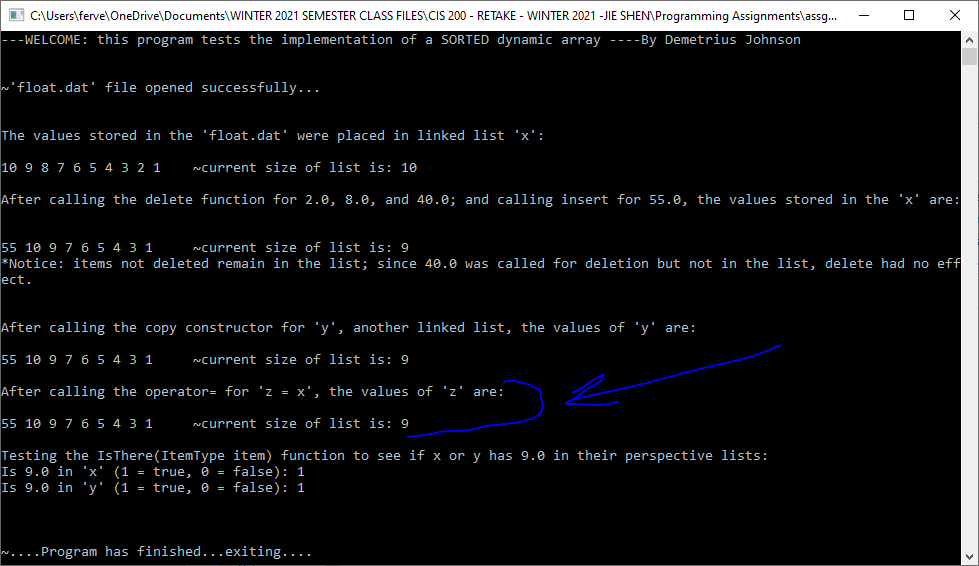
### TEST 2:



### TEST 3:



### TEST 4:



### TEST 5:

