In this lab, we will implement Bag using linked list. The head node points to the first node of the linked list which stores the first entry. In addition to the methods we implemented in the lecture, you need to implement equals and removeDuplicates. Equals method determines if two bag are equal based on their contents. removeDuplicates method guarantees that each item in the bag occurs only once by removing any extra copies.

Steps:

1. Start a new project named Lab04BagLinkedList
2. Download the following four files from the Canvas and copy into the src folder of your project.
   1. BagExtensionsTest.java [Tests equals and removeDuplicates]
   2. BagInterfaceExtension.java
   3. LinkedBagDemo.java [Test all the methods except equals and removeDuplicates]
   4. LinkedBagJUnitTester [Test all the methods except equals and removeDuplicates]
3. In Eclipse, right click on your project folder and choose Refresh. The four files you downloaded should show up in the project. Open these files. You will get an error message in the JUnit tester. FIX IT by adding the Junit library to your project.

**Right click on the project -> Properties -> java build path -> add library -> Junit -> finish -> okay**

**On your own you will complete the rest of this by the end of class:**

1. Create a new class LinkedBag which implements BagInterfaceExtension. Implements all the required methods.

**Hint:***removeDuplicates:* Create a new LinkedBag that holds the unique entries. You need nested loops. The outer loop will scan over the original LinkedBag. The inner loop will scan over the new LinkedBag to see if an item is already in the new LinkedBag. If the item is not already in the new LinkedBag add it. Finally, after the outer loop is complete, change the firstNode reference and the numberOfEntries. (You could remove duplicate values from the LinkedBag as we scan over it, but modifying a LinkedBag as you scan it is inherently more complicated and liable to errors.)

*equals:* You can determine if two bags are equal by comparing the frequencies of the items in the bags.

**Grading Rubric:**

getCurrentSize and isEmpty 10 points

getFrequencyOf and contains 10 points

add 10 points

remove() 10 points

remove(T) 10 points

clear() 10 points

toArray 10 points

removeDuplicates 15 points

equals 15 points

Total 100 points.

**What to do when you are done:**

Submit java files to the appropriate submission folder on Canvas.