

Assignment 01: Fun with Sets**Due Date:** Friday, September 09; 23:00 hrs**Total Points:** 10

This assignment will help us practice with arrays and linked lists. We will also understand the notion of an abstract data type, that is, changing the underlying implementation of an ADT does not affect other programs that only interact with the ADT through its public interface.

Integer Set (10 points): In this problem, we will be changing an implementation of the integer set data structure from arrays to linked lists. A set data structure maintains a collection of non-duplicated elements, and supports the following operations: `insert(key)` that inserts a new key into the set; `remove(key)` that removes the key from the set; and `find(key)` that finds if a given key is present or absent in the set. In our integer set, an assert statement checks for valid input to both the `insert` and `remove` operations: that is, it checks if the newly inserted key is not a duplicate during `insert`, and that the removed key is present during `remove`. In addition, the `print` method prints the contents of the set in sorted order.

The `IntSet` class implements all the operations using an array as the underlying implementation. In this problem, you will change the implementation to singly linked lists. Note that the driver (or user) program `IntSetDriver.java` should still work, since it only interacts with the public interface of `IntSet`. You should not change the public interface of the `IntSet` class, but feel free to include other private methods that may be useful to your implementation.

Submission: Please submit the files `IntSet.java` and `Node.java` (if applicable) as a single zip archive `h01.zip` through ASU Learn. The zip archive should only contain the individual files of the assignment, and these files should not be inside folders. Moreover, please do not include other extraneous files. Only include all files that belong to your solution.

Input/ Output Instructions: For all programs, until and otherwise stated, we will be taking the input from standard input (`System.in`) and will be sending the output to standard output (`System.out`). Since we will be using an automatic grading system, please make sure that your output format exactly matches the sample outputs. So make sure that there are no extraneous output in terms of spaces, newlines and other characters.

Notes on Coding: Please do not include user-defined packages in your code. Your code should run in the Unix/Linux machine using the commands `javac` and `java`.

Please note that you are **not allowed to use Java Collections** which contain pre-defined libraries for many of the data structures that we learn in class. The purpose of these assignments is to build these data structures from first principles. Programs that includes these objects will receive 0 points.