Department of Computer Science and Engineering
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CIIC 4020 / ICOM 4035 – Data Structures
Spring 2019-2020
Laboratory #1 – Bags and Sets

Use Eclipse to develop code for the following problems.

1. Consider a member method for the Bag ADT that returns a Bag with the items that are more frequent than an item in the bag. The prototype for the method is a follows:

   public Bag moreFrequentThan(Object obj)

   This method **DOES NOT** add duplicate entries in the resulting Bag. Add this method to the Bag interface, then implement it in the StaticBag and DynamicBag classes.

   A test program is provided, although you might have to change the package names. For the subsequent exercises, you should create your own tests, possibly by updating previously created test programs.

2. Consider a member method for the Set ADT used to compare two sets and determine whether they are equal (i.e. they have the same elements). Add this method to the Set interface, then implement it in the StaticBag and DynamicBag classes using the following prototype:

   public boolean equals(Set<E> S2)

3. Suppose you are given an array of Set<Integer> instances. Write a non-member static method called checkDisjoint() which returns true if the intersection of the array is empty. The prototype for the method is:

   public static boolean checkDisjoint (Object[] sets)

4. Consider a member method for the Set ADT called singletons(). Given a set A = $\{x_0, x_1, \ldots, x_n\}$, the singleton set of A is a collection of sets (i.e. a set of sets), each containing only one element of A: S = $\{\{x_0\}, \{x_1\}, \ldots., \{x_n\}\}$. The prototype for the method is as follows:

   public Set<Set<E>> singletonSets()

   Add this method to the Set interface, then implement it in the StaticSet and DynamicSet classes. For the DynamicSet class, simply return the result generated by the StaticSet instance. Test your code!
   Hint: `Set<Set<E>> result = new StaticSet<Set<E>>(this.size());`