CS 111C Homework 2: Array Based Lists

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For the questions that refer to the three classes described in the chapter, you only need to answer for the `AList` class. You do not need to answer for the `DynamicArrayList` and `VectorList classes.`

100 points total.

1. Add a constructor to each of the classes `AList,ExpandableArrayList, and VectorList` that creates a list from a given array of objects. (10 points)

2. Suppose that you want an operation for the ADT list that returns the position of a given object in the list. The header of the method could be as follows:

```
public int getPosition(T anObject)
```

where `T` is the generic type of the objects in the list. Write an implementation of this method for each of the three classes described in this chapter. (10 points)

3. Suppose that you want an operation for the ADT list that removes the first occurrence of a given object from the list. The header of the method could be as follows:

```
public boolean remove(T anObject)
```

where `T` is the generic type of the objects in the list. The method returns true if the list contained `anObject` and that object was removed. Write an implementation of this method for each of the three classes described in this chapter. (10 points)

4. Suppose that you want an operation for the ADT list that moves the first item in the list to the end of the list. The header of the method could be as follows: `public void moveToEnd()` Write an implementation of this method for each of the three classes described in this chapter. (10 points)

6. Implement a method replace for the ADT list that returns the replaced object. Do this for each of the three classes described in this chapter. (10 points)

7. Suppose that a list contains `Comparable` objects. Implement the following methods for each of the three classes described in this chapter.

a. The method `getMin` that returns the smallest object in the list (10 points)

b. The method `removeMin` that removes and returns the smallest object in the list (10 points)

8. Implement an equals method for the ADT list that returns true when the entries in one list equal the entries in a second list. In particular, add this method to the classes AList and VectorList. (10 points)

10. The class `ExpandableArrayList` has an array that can grow in size as objects are added to the list. Consider a similar class whose array also can shrink in size as objects are removed from the list.

Accomplishing this task will require two new private methods. The first new method checks whether we should reduce the size of the array: `private boolean isTooBig()` This method returns true if the number of elements in the list is less than half the size of the array and the size of the array is greater than 20.

The second new method creates a new array that is ¾ the size of the current array and then copies the objects in the list to the new array: `private void reduceArray()`

Implement each of these two methods for our new class. Then use these methods in the definition of the method `remove`. (20 points)