Activity 9: Implementing the Elevens Board

Introduction:

In Activity 8, we *refactored* (reorganized) the original `ElevensBoard` class into a new `Board` class and a much smaller `ElevensBoard` class. The purpose of this change was to allow code reuse in new games such as Tens and Thirteens. Now you will complete the implementation of the methods in the refactored `ElevensBoard` class.

Exercises:

1. Complete the `ElevensBoard` class in the **Activity9 Starter Code** folder, implementing the following methods.

   Abstract methods from the `Board` class:

   a. `isLegal` — This method is described in the method heading and related comments below. The implementation should check the number of cards selected and utilize the `ElevensBoard` helper methods.

```
/**
 * Determines if the selected cards form a valid group for removal.
 * In Elevens, the legal groups are (1) a pair of non-face cards
 * whose values add to 11, and (2) a group of three cards consisting of
 * a jack, a queen, and a king in some order.
 * @param selectedCards the list of the indexes of the selected cards.
 * @return true if the selected cards form a valid group for removal;
 *         false otherwise.
 */
@Override
public boolean isLegal(List<Integer> selectedCards)
```

b. `anotherPlayIsPossible` — This method should also utilize the helper methods. It should be very short.

```
/**
 * Determine if there are any legal plays left on the board.
 * In Elevens, there is a legal play if the board contains
 * (1) a pair of non-face cards whose values add to 11, or (2) a group
 * of three cards consisting of a jack, a queen, and a king in some order.
 * @return true if there is a legal play left on the board;
 *         false otherwise.
 */
@Override
public boolean anotherPlayIsPossible()
```

`ElevensBoard` helper methods:

c. `containsPairSum11` — This method determines if the selected elements of `cards` contain a pair of cards whose point values add to 11.

```
/**
 * Check for an 11-pair in the selected cards.
 * @param selectedCards selects a subset of this board.  It is this list
 *                      of indexes into this board that are searched
 *                      to find an 11-pair.
 * @return true if the board entries indexed in selectedCards
 *              contain an 11-pair; false otherwise.
 */
private boolean containsPairSum11(List<Integer> selectedCards)
```

d. `containsJQK` — This method determines if the selected elements of `cards` contains a jack, a queen, and a king in some order.

```
/**
 * Check for a JQK in the selected cards.
 * @param selectedCards selects a subset of this board.  It is this list
 *                      of indexes into this board that are searched
 *                      to find a JQK-triplet.
 * @return true if the board entries indexed in selectedCards
 *              include a jack, a queen, and a king; false otherwise.
 */
private boolean containsJQK(List<Integer> selectedCards)
```

When you have completed these methods, run the `main` method found in `ElevensGUIRunner.java`. Make sure that the Elevens game works correctly. Note that the cards directory must be in the same directory with your `.class` files.

Questions:

1. The size of the board is one of the differences between *Elevens* and *Thirteens*. Why is `size` not an abstract method?

2. Why are there no abstract methods dealing with the selection of the cards to be removed or replaced in the array `cards`?

3. Another way to create "IS-A" relationships is by implementing interfaces. Suppose that instead of creating an `abstract Board` class, we created the following `Board` interface, and had `ElevensBoard` implement it. Would this new scheme allow the Elevens GUI to call `isLegal` and `anotherPlayIsPossible` polymorphically? Would this alternate design work as well as the `abstract Board` class design? Why or why not?

```
public interface Board
{
   boolean isLegal(List<Integer> selectedCards);

   boolean anotherPlayIsPossible();
}
```