Lab wk2-1: Gray Codes

Recall an efficient way to represent subsets is using a 1 or 0 in the i-th position to represent that either the i-th item is in the subset or it is not in the subset. For some applications it is most efficient if a subset differs from the previous subset in at most one position. That is, either a single 0 will change to a 1 or a single 1 will change to a 0 with all the other bits remaining the same. This is called a Gray code.

You are to implement this recursively as follows:

A Class, **GrayCode.java**, must meet the following specifications:

- Implement a method **getGrayCode(int n)** that returns an ArrayList of strings where each string is a bitstring (contains only the characters 0 and 1) that represent the subsets of a set containing n elements. Your method must return the Gray Code as described below.
- Your program must be well structured, commented, and easy to read.
- the method must be **recursive and must follow the high level description below or it may not pass the tests**. See below for the desired output for the gray code of sets with 2 or 3 elements.

1. Take all the subsets of the n-1 items in a Gray code order and prepend a 0 to create a subset of n items without the n-th item.
2. Then reverse the same list of subsets of the n-1 items in a Gray code order and prepend a 1 to them to create subsets of items that do contain the n-th item,

Implement this **recursively** with a base case of an ArrayList of with two strings "0" "1" representing the two subset of a set with a single item.
A call to your function for sets with 2 items would return "00" "01" "11" "10".

For 3 items it would be "000" "001" "011" "010" "110" "111" "101" "100"
Note the first four strings above are the four strings returned for a two item set but with "0" prepended and then the last four are the four strings returned for two item set in the reverse order with "1" prepended.

Make sure to test it for 4 items. Manually generate the Gray code for four items as described above and have one of the TA's check that you have done it correctly.