JAVA PROGRAMMING LANGUAGE
Assignment 6

1. Define a class called *Counter* whose objects count things. An object of this class records a count that is a nonnegative integer. Include methods to set the counter to 0, to increase the count by 1, and to decrease the count by 1. Be sure that no method allows the value of the counter to become negative. Include an accessor method that returns the current count value and a method that outputs the count to the screen. There should be no input method or other mutator methods. The only method that can set the counter is the one that sets it to 0. Also, include a *toString* method and an *equals* method. Write a program (or programs) to test all the methods in your class definition.

2. A histogram is used to plot tabulated frequencies. Create a *Histogram* class that can be used to maintain and plot the frequencies of numbers that fall within a specified range. The *Histogram* class contain will an array of counters with equal intervals within the specified range. Use the *Counter* class created in problem 1 above. All counters are first initialized to zero. When the number added to the *Histogram* falls within the range of a particular counter that counter is incremented by one.

   The Histogram class should contain the following methods:

   - A constructor that accepts the number of counters and the maximum and minimum limits of the numbers (.i.e., the range of numbers).
   - A second constructor that accepts the maximum and minimum limits of the numbers and initializes the Histogram with 10 counters for the specified range.
   - An *add(double x)* method that increments the corresponding counter.
   - A *reset()* method that sets all counter frequencies to zero.
   - A *plotFrequency()* method that plots the counter frequencies.
   - A *plotCumulative()* method that plots the cumulative frequencies.

   Write a RandomNumberTester class that uses the Histogram class to test the Random number class provided in the java SDK.

   Test 1: Create 10 counters with the following limits:

Bin Number	**Limit**
Counter 0	0 <= x < 0.1
Counter 1	0.1 <= x < 0.2
Counter 2	0.2 <=x < 0.3
Counter 3	0.3 <=x < 0.4
Counter 4	0.4 <= x < 0.5
Counter 5	0.5 <= x < 0.6
Counter 6	0.6 <= x < 0.7
Counter 7	0.7 <= x < 0.8
Counter 8	0.8 <= x < 0.9
Counter 9	0.9 <= x < 1.0

   Generate a random number between 0 and 1. Increment the corresponding counter by 1. Repeat this 10,000 times. Print the counter frequencies and the cumulative frequencies.

Test 2: Create 10 counters with the following limits:

Bin Number	**Limit**
Counter 0	0 <= x < 1
Counter 1	1 <= x < 2
Counter 2	2 <= x < 3
Counter 3	3 <= x < 4
Counter 4	4 <= x < 5
Counter 5	5 <= x < 6
Counter 6	6 <= x < 7
Counter 7	7 <= x < 8
Counter 8	8 <= x < 9
Counter 9	9 <= x < 10

Generate 10 random numbers between 0 and 1 and add them up. Increment the corresponding bin by 1. Repeat this 1,000 times. Print the counter frequencies and the cumulative frequencies. Any surprises/comments?