Assignment 7 (Extra Credit)

**Due:** Friday, April 16 by 11:59 PM

**Objective**

This assignment will give you practice with using generic classes in Java.

**Task**

Write a generic ArrayTester class that contains an array and a CustomTest and prints or counts the elements of the array if they pass the test. Also write a couple of CustomTest classes. Your final jar file will contain the following source code files:

* ArrayTester.java
* CustomTest.java
* IsEven.java
* AllLower.java
* GreaterThan.java
* ECTester.java

All of the above will be created by you except ECTester.java, which you should download (and turn in an unedited version of) from the Canvas site for Assignment 7.

**Each file should have a comment including your name at the top of the file. Each file should also have appropriate comments throughout**.

**Requirements**

1. **CustomTest<T> interface:** This should be a generic interface that requires a single method, test. This method should take in an element of the generic type T and return a boolean. This function will be used to determine whether a particular object of type T passes the test or not.
2. **ArrayTester<T> class**: This should be a generic class. It should contain two member data: an array of type T and an object of type CustomTest<T> called tester. It should contain at least three methods:

* Constructor – A single constructor, which should take in a parameter of type T[] and a second parameter of type CustomTest<T>. This constructor should assign these parameters to the member data of the class. It should also sort the array based on its *natural ordering*.
* printIfValid() – This method should print out each element of the array that passes the test given by tester. Each element should be separated by a single space and the entire list should be followed by a new line (see sample output). It should not return anything.
* countIfValid() – This method should return an integer that counts the number of elements in the array that pass the test given by tester.

1. **IsEven<T> class**: This should be a generic class that implements the CustomTest<T> interface. It should accept as a type parameter any class that is a subclass of Number. The test in this class should return true if the *integer value* of the object passed in is even, false otherwise.

1. **AllLower class**: This should be a non-generic class that implements the CustomTest<T> interface. This will test objects of type String and the test method should return true if the letters in the String are all lowercase.

1. **GreaterThan<T> class**: This should be a generic class that implements the CustomTest<T> interface. It should accept as a type parameter any class that is guaranteed to have the CompareTo(T) method. This class will have one piece of member data of type T. That value of that piece of member data should be the same as a parameter passed into the constructor (so you should have a one-parameter constructor). The test in this class should return true if the object passed in is considered greater than the piece of member data (by the type’s *natural ordering*), false otherwise.

1. **Other Requirements:**

* When you run the ECTester program, your output should match the sample output **exactly**

**Sample Output**

This is exactly the output that an unedited ECTester program should have:

There are 5 valid integers

They are:

2 4 6 8 10

There are 5 valid doubles

They are:

0.2 4.2 10.0001 12.2 123456.0

There are 4 valid strings

They are:

a desk? is raven

There are 6 integers greater than 4

They are:

5 6 7 8 9 10

There are 5 doubles greater than 4.5

They are:

5.4 10.0001 11.9 12.2 123456.0

There are 3 strings greater than "last"

They are:

liKe raven wriTing

**Submitting**

Pack all of your files (class files **and** source code) into a fully runnable JAR file called ec.jar. The main program that the jar file should execute should be an unedited version of the ECTester.java file. I should be able to run the main() method from your file with the command:

java -jar ec.jar

Submit your jar file via the Canvas submission link for Assignment 7.