COP 3337
Programming II

Examination 1

Name: _____

SAMPLE

This exam has 3 additional pages with 3 questions.

1. [**40 pts**]

   Implement a very minimal **BigComplex** complete class. A **BigComplex** stores a real part and an imaginary (as **BigIntegers**). For the purposes of this exam, you may assume that there are no negative components and you do not have to check for these conditions. For this question you need to provide the data representation and the following methods.

   - A constructor that takes two **BigIntegers** as parameters, representing the real and imaginary parts. The constructor must be implemented.
   - A constructor that takes two **Strings** as parameters, representing the real and imaginary parts. The constructor must be implemented.
   - A constructor that takes no parameters and results in a **BigComplex** that represents zero. The constructor must be implemented.
   - A constant **BigComplex** named **ZERO**.
   - **add**, which returns a new **BigComplex** representing the sum of this **BigComplex** and another **BigComplex**.
   - **equals**

2. [**30 pts**] Assume that in addition to valid `toString` and `equals` methods, a `BigRational` class contains the following members:

```
public BigRational( String rat );          // construct new BigRational
public BigRational add( BigRational rhs ); // return this+rhs
```

(a) Method `readFile` reads the specified file, which contains one rational number per line, and returns an `ArrayList` containing the rational numbers it encounters. You do not have to handle any exceptions or provide any import directives. Implement `readFile`. The signature is:

```
public static ArrayList<BigRational> readFile( String fileName )
```

(b) Method `sum` returns the sum of all the rationals in its parameter. Implement `sum`. The signature is:

```
public static BigRational sum( ArrayList<BigRational> theList )
```

3. [**30 pts**] A `cop3337.MyBinaryArray` represents arbitrarily long sequences of binary variables. This question asks you to implement the constructor and one method of `cop3337.MyBinaryArray`.

The data representation for `cop3337.MyBinaryArray` consists of an array representing the booleans. For instance, the representation of the `cop3337.MyBinaryArray` "TFTTF" would be an array with length five storing true, false, true, true, false in array indices 0, 1, 2, 3, and 4 respectively.

Implement a `cop3337.MyBinaryArray` class that contains the following:

(a) A one-parameter constructor that contains a string. Throw an `IllegalArgumentException` if there are illegal characters.

(b) A `toString` method.

(c) The data representation, as outlined above.