Labtest 1E Non-Programming Questions — Feb 12, 2014

Total marks: 30.

1. [10 marks total, 1 mark each] Say whether the following statements are *true* or *false*.

   a) A utility class should have a `private` constructor that either does nothing or throws an exception.

   b) A `final` attribute should always be declared as `private`.

   c) A static method can access a non-static attribute.

   d) A non-static method can access a static attribute.

   e) A method is responsible for checking that its preconditions are true.

   f) A method is responsible for ensuring that its postconditions are true.

   g) The scope of an attribute is the entire class where it is declared.

   h) The scope of a parameter of a method is the entire class where the method is declared (i.e., if a method has a parameter named `x` then all of the other methods have access to `x`).

   i) For two `Double` references `u` and `v`, if `u.compareTo(v)` returns a negative integer, then the number represented by `u` is less than the number represented by `v`.

   j) If `x.equals(y)` returns `false`, then `x.hashCode()` **must** return a different value from `y.hashCode()`.

2. [6 marks] Suppose that you want to make the class `Money` discussed in the programming question immutable. What changes would you need to make? (You do not need to give the modified code.)

3. [14 marks] Suppose that we have a utility class named Q3.

   a) [4 marks] Suppose that Q3 has the following method API:

   ```
   /**
    * Increases the value of the parameter k by 1.
    * When the client uses this method like so:
    *
    *     Q3.addOneTo(x);
    *
    * the value of x will increase by 1.
    */
   public static void addOneTo(int k)
   ```

   Is it possible to implement such a method? Explain why or why not.

   b) [2 marks] Suppose that Q3 has the following static attribute:

   ```
   private static int k = 1;
   ```

   Inside of the method addOneTo from part a), what name do you use to refer to the static attribute named k?

   c) [4 marks] Suppose that Q3 has the following method API:

   ```
   /**
    * Changes the width of r to 100. When the client uses this
    * method like so:
    *
    *     Q3.changeWidth(someRectangle);
    *
    * the width of someRectangle will be 100.
    */
   public static void changeWidth(Rectangle r)
   ```

   Is it possible to implement such a method? Explain why or why not. Assume that Rectangle has a public method named setWidth that sets the width of the rectangle, and that 100 is a valid width for a rectangle.

d) [4 marks] Suppose that Q3 has the following method API:

```
/**
 * Makes r refer to a new rectangle. When the client uses this
 * method like so:
 *
 *      Rectangle original = someRectangle;
 *      Q3.referToNew(someRectangle);
 *
 * someRectangle will refer to a new rectangle; that is
 *
 *      original == someRectangle
 *
 * will now be false.
 */
public static void referToNew(Rectangle r)
```

Is it possible to implement such a method? Explain why or why not.