Computer Science I — Spring 2018

Exam #1

This exam should have four pages. Closed book and notes.
You are welcome to use the back of a page if you need more room.

Problem 1: [24 points]

a) We’ve seen methods that print information to the terminal window, and also methods that return values. What’s an advantage of returning a value instead of printing it?

b) What do we mean by the "state" of an object?

c) Explain the role of a constructor. Why might you want more than one in a given class?
public class TurtleArmy
{
    Turtle comet;   // Our first, ferocious turtle
    Turtle cupid;   // Don't let the name fool you...

    public void mystery(Turtle terry)
    {
        if (comet.getDistance() < cupid.getDistance() &&
            comet.getDistance() < terry.getDistance())
        {
            comet = terry;
        }
        else
        {
            if (cupid.getDistance() < comet.getDistance() &&
                cupid.getDistance() < terry.getDistance())
            {
                cupid = terry;
            }
        }
    }    // Other methods omitted...
}

Problem 2: [25 points]

a) Assume the mystery method above has been added to the TurtleArmy class from lab. (Recall that Turtle objects have a distance field, as well as an X and Y direction and a circle that represents their location. Assume that getDistance() returns the distance value.) If mystery is passed a reference to a Turtle with a distance of 15, and comet and cupid refer to Turtle instances with distances of 10 and 20, respectively, what does the method do? (You might consider drawing an object diagram if that helps, though it’s not required for full credit.)

b) In English, describe what the method does in general. (Try to focus on what it does rather than a step-by-step description of how it works.) To get in the right frame of mind, think about what you would write as a comment for the method.
Problem 3: [25 points]

Below, define a method called `longestString` that takes three `String` objects as inputs and returns the longest of the three. If there’s a tie for the longest string, you can return any of the strings tied for longest. (For example, if passed “hello”, “java”, and “world”, it could return either “hello” or “world”, but not “java”.) Recall that there’s a `length()` method in the `String` class that will come in handy here.
Problem 4: [26 points]

The start of the TurtleArmy class is shown back in Problem 2. Below, define a method called makeDistancesEqual that could be added to the class. (You don’t need to write anything except the code for this method.) It should make the distance values in comet and cupid the same by changing the smaller of the two so that it’s the same as the larger of the two. For example, if comet had a distance of 10 and cupid had a distance of 20 before calling this method, they should both have a distance of 20 after it has been called. If the two values are already the same, print an insulting message. You may assume that any “setter” and/or “getter” methods you need are defined.