Computer Science I — Spring 2016

Exam #1

This exam should have four pages. Closed book and notes.

Problem 1: [24 points]

a) Briefly explain the difference between a class, an instance, and an object.

b) Explain the role of a constructor. Why might you want more than one in a given class?

c) What’s the difference between declaring and initializing a variable?
import java.util.Random;

public class ExamCode {
    public static void main(String[] args) {
        String word = new String("mississippi");
        Random rng = new Random();

        int length = word.length();
        int index = rng.nextInt(length);

        String word2 = word.substring(index);
        length = word2.length();
        index = rng.nextInt(length)+1;

        String word3 = word2.substring(0, index);
        System.out.println(word);
        System.out.println(word3);
    }
}

Problem 2: [30 points]

a) When the main method above is executed, what output would be printed if the first call to
nextInt returned 2 and the second call to nextInt returned a 4?

b) In English, describe what the method does. (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.
public class Point
{
    private int x; // The x coordinate of this point
    private int y; // The y coordinate of this point

    public Point(int theX, int theY) {
        x = theX;
        y = theY;
    }

    public String toString() {
        return "(\"x\",\"y\")";
    }
}

Problem 3:

The problems below refer to the Point class above. You do not need to provide comments when writing code below.

a) [14 points] The code above shows most of the Point class we wrote in lecture. Below, write a setX method that could be added to the class. It should take a single integer as its argument, and set the Point’s x coordinate to the specified value.

b) [14 points] Write a getY method that returns a Point’s y coordinate.
c) **[18 points]** Write a constructor that builds Points with random x and y coordinates. For full credit, the constructor should take a single integer as its argument, and use that as an upper bound on the coordinate values. For example, if the constructor is called with 100 as its argument, it should create a point whose x and y coordinates are both within the range of -100 to 100 (inclusive).