

Name \_\_\_\_\_

1. Number these steps for writing a program in the proper order, 1 through 4 (10 pts):

ANSWER

- 3 Write the program code.
- 2 Write comments describing how the program works.
- 1 Write comments describing what the program does.
- 4 Test the program.

2. What does the program below print (10 pts)? How long does it take to run (5 pts)?

```
public class Problem2 extends Thread {
    private int seconds = 10;

    Problem2(int seconds) {
        this.seconds = seconds;
    }

    public void run() {
        try {
            sleep(seconds*1000);
        }
        catch (InterruptedException x) {
            System.out.println("bye");
        }
        System.out.println(seconds);
    }

    public static void main(String[] args) {
        Thread a = new Problem2(3);
        a.start();
        Thread b = new Problem2(1);
        b.start();
        System.out.println("hello");
    }
}
```

ANSWER:

- hello (immediately)
- 1 (after 1 second)
- 3 (after 2 more seconds, 3 total)

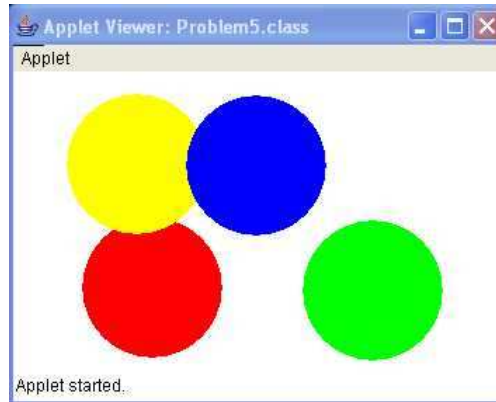
3. Write a program that creates a text file in the current directory named *hello.txt* containing the text *hello world* on a single line (20 pts).

```
// ANSWER
import java.util.Formatter;
import java.io.File;
public class Hello {
    public static void main(String args[]) throws Exception {
        Formatter out = new Formatter(new File("hello.txt")); //or new Formatter("hello.txt")
        out.format("hello world\n");
        out.close();
    }
}
```

4. What is the difference between a server and a client? (5 pts). Which would use the URL class (5 pts)?

ANSWER: A server runs all the time. A client initiates the connection to the server. A URL is used in a client.

5. Write an *applet* that allows the user to draw up to 4 solid filled circles, each a different color (red, yellow, blue, and green) on a white background. Initially the screen is blank. When the user clicks the mouse in the applet, a new circle with a diameter of 100 pixels should appear centered over the mouse cursor. If there are already 4 circles, then the oldest circle should be removed, and the new circle drawn in the same color as the one removed so that there are never more than 4 circles shown at one time, and never two in the same color (45 pts).



```
// ANSWER
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;

public class Problem5 extends JApplet {
    private int x[] = new int[4], y[] = new int[4]; // Positions of last 4 circles
    private int circles = 0; // number of user clicks, may be more than 4
    private Color colors[] = {Color.RED, Color.YELLOW, Color.BLUE, Color.GREEN};

    // Draw all circles, up to 4. Color depends on the position in the array.
    public void paint(Graphics g) {
        g.setColor(Color.WHITE); // Clear screen
        g.fillRect(0, 0, getWidth(), getHeight());
        for (int i=0; i<circles && i<4; ++i) {
            g.setColor(colors[i]);
            g.fillOval(x[i]-50, y[i]-50, 100, 100);
        }
    }

    // Save the circle position. If the array is full, then circles % 4
    // is the circle to be replaced with a new x,y (but same color).
    public void init() {
        addMouseListener(new MouseAdapter() {
            public void mouseClicked(MouseEvent e) {
                x[circles % 4] = e.getX();
                y[circles % 4] = e.getY();
                ++circles;
                repaint();
            }
        });
    }
}
```