

1. Matching [20 pts]

Choose the **best** definition for each term.

1. _____ Class
 2. _____ Bytecode
 3. _____ Object
 4. _____ Package
 5. _____ new
 6. _____ Primitive data type
 7. _____ Inheritance
 8. _____ Application
 9. _____ Applet
 10. _____ final
- A.** A collection of similar classes grouped together
 - B.** A fundamental element of data such as int, float or char
 - C.** The sequence (or order) of statements that is executed
 - D.** The contents of a .class file, the equivalent of machine language for the Java virtual machine
 - E.** A Java program that executes in stand-alone mode and has a main method
 - F.** A Java reserved word used to create a constant value that cannot be modified
 - G.** A Java program that executes in a web browser and doesn't require a main method
 - H.** Creating one class from another class by reusing the original class's blueprint
 - I.** An instance of a class
 - J.** Hiding the complexity of implementation behind a simple-to-understand concept, such as the Graphics class hiding the details of actually rendering on the screen
 - K.** A java reserved word that lets us instantiate new objects
 - L.** A blueprint for creating objects, a collection of data and methods
 - M.** A Java reserved word that allows you to exit a loop immediately

2. Expressions [16 pts]

What is the value and the type of the following expressions?

4 (a) $6 - 2 + 3 * 4 - 7 / 2$

Value:

Type:

4 (b) $((8 + 3) + (10 \% 3)) * (5 - 3)$

Value:

Type:

4 (c) $5.0 * 2 / 4 + 5.5$

Value:

Type:

4 (d) `false || (true && false) && true || (!false || false)`

Value:

Type:

3. **Compilation [12 pts]**

The following code segments have a compilation error. Explain what the error will be and why it will occur.

(a)

```
float val;
double d1, d2;

d2 = 10.0;
d1 = d2 / 2;
val = 4 + (2.0 * d1);
System.out.println("the value is " + val);
```

(b)

```
Random rand;
int val;

rand = new Random();
val = Random.nextInt(10) + 1;
System.out.println("Random number between 1 and 10 is " + val);
```

4. Applets [10 pts]

Consider the following paint method for answering the following two questions. Circle the letter of the correct answer.

```
public void paint(Graphics page)
{
    setBackground(Color.white);
    page.setColor(Color.blue);
    page.fillRect(50, 50, 100, 100);
    page.setColor(Color.white);
    page.drawLine(50, 50, 150, 150);
    page.drawLine(50, 150, 150, 50);
    page.setColor(Color.black);
    page.drawString("A nice box", 50, 170);
} //end paint method
```

- 5 (a) The figure drawn in this applet is
- a. a blue square
 - b. a blue square with two white lines drawn horizontally through it
 - c. a blue square with two white lines drawn diagonally through it
 - d. a blue square with two white lines drawn vertically through it
 - e. a white square with two blue lines drawn vertically through it
- 5 (b) The String "A nice box" is drawn
- a. above the box
 - b. to the left of the box
 - c. to the right of the box
 - d. below the box
 - e. inside the box

5. Tracing and String Operations [12 pts]

What is the output when the following code segment is run?

```
public class StringOps {

    public static void main(String s[])
    {
        int i,len,value;
        char ch;
        String name = new String("angela");
        String addr = new String("oak street");
        String bday = new String("07/16/1945");

        i = 4;
        ch = name.charAt(i);
        len = bday.length();
        value = name.compareTo(addr);
        if (value == 0)
            System.out.println("It's zero");
        else if (value < 0)
            System.out.println("It's negative");
        else
            System.out.println("It's positive");
        System.out.println("char is " + ch +
            " and length is " + len);

        bday = name;
        value = name.compareTo(bday);
        if (value == 0)
            System.out.println("It's zero");
        else if (value < 0)
            System.out.println("It's negative");
        else
            System.out.println("It's positive");
        System.out.println(bday);
        System.out.println(name);
    }
}
```

Output:

6. Coding and Expressions [20 pts]

The distance between two points (x_1, y_1) and (x_2, y_2) is defined to be the value $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Write a program (i.e., fill in the code below) that reads in two points (4 doubles) and calculates the distance between them. Assume that you have the Keyboard class with method `double readDouble()` available, and you have access to a class `Math` that has static methods:

```
public static double sqrt(double a)
public static double pow(double a, double b)
public static double abs(double a)
```

You must write a main method (next page) that reads in the four coordinates and passes them to a method `calcDistance` as parameters. The method `calcDistance` (this page) should calculate the distance between the two points and return that value as a double. The main method receives the distance back from the method and prints it out.

```
import cs1.Keyboard;

public class Points {

    // place calcDistance method here
```

```
// place main here
```

```
} // end class Points
```

7. Coding and Input [10 pts]

Write a method named `getXCoord()` which prompts the user for an integer, then reads the integer from the keyboard and verifies that it is between zero (0) and a class constant `MAXCOORD`, inclusive. The method should continue to prompt the user for an integer until the integer is in the valid range 0-`MAXCOORD`. Assume you have access to the `Keyboard` class and the method `int readInt()`. Your method should return the valid coordinate.

```
public int getXCoord( ) {  
    int x;
```

```
} //end method getXCoord
```