I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech community.

CS 1316 - Exam 1 - Fall 2009

Problem	Earned Points	Possible Points
1. Vocabulary		15
2. Fill in the Blank		6
3. Code Tracing		5
4. Turtle Graphics		6
5. Draw Line		15
6. My Counter		10
7. Identify Syntax Problems		8
8. Build a Subclass		10
Total:		**75**

1. Vocabulary (15 points)

For each of the following words, write a 1-2 sentence definition of the word as used in this class. Your definition should be concise and to the point, while demonstrating that you know what the term means.

a) method signature -

b) static -

c) model -

d) field -

e) object -

2. Fill in the Blank (6 points)

I am in Section A _____ and my grading TA's name is: _____.

In Java, a semicolon (;) character is used to _____.

The operator && indicates a _____, while the || operator indicates a _____

Assume that an Employee class is a subclass of the Person class. A variable that is of type _____ can point to an object of type Employee and to an object of type Person.

3. Code Tracing (5 points)

Trace through the following Java code and write down what it **prints** out.

```
int [] a = new int[10];

for ( int i = 0; i < 10; i++) {
     a[i] =  i;
}

for( int i = 0; i < 10; i++) {
     int index = a[9-i];
     a[i] = a[  index ];
}

for(int i = 0; i < 10; i++) {
   System.out.println( a[i] );
}
```

4. Turtle Graphics (6 points)

The following code creates a turtle and uses it to draw a graphic. Assume the box on the right represents the World object given to the turtle. (Remember that turtles start in the center of their world, facing north/up). Draw the graphic drawn by the turtle. You do not need to draw the turtle.

```
Turtle t = new Turtle(new World());
for( int i = 0; i < 20; i++) {
  if (i %2 == 0) {
     t.turn(36);
  } else {
     t.forward(90);
  } // end if/else
} // end for
```

5. Draw Line (15 points)

The variable **pic** already points at a Picture object that is some unknown number of pixels wide and some unknown number of pixels high. Write Java code that will draw a 5 pixel wide vertical red line directly down the middle of pic. (E.g. If the width of pic was 100, the line should be centered on the pixels with horizontal index 50, extending from pixels 48-52). You do not have to put the code inside of a function or class, just give us the code. You may assume the picture is at least 5 pixels wide and at least 1 pixel high.

6. My Counter (10 Points)

Write a Java class called "Counter" that keeps track of how many objects of its type have been instantiated. To do this, create a default constructor for the class that adds one to a static integer class variable called "objectCount". (Make sure that "objectCount" is initialized with the value zero.) Also, write a static method called "getObjectCount" that returns your global variable as an integer.

After creating your Counter object, the following would be possible in the Interactions Tab in Dr. Java:

```
> Counter.getObjectCount()
0
> Counter myCt = new Counter()
> Counter.getObjectCount()
1
> Counter myCt2 = new Counter()
> Counter.getObjectCount()
2
```

7. Identify Syntax Problems (8 points)

A student wrote the following code for one of the class projects. He couldn't get it to compile, so he asked you for help. Please identify and fix all the errors.

```
public Book {

  private page_number;
  private int[] bookmarks;

  public Book(int page_number){
    page_number = page_number;
  }

  public addBookMarks(marks){
    bookmarks = marks;
  }

  public static void main(){
    Book book = new Book(150.0);

    int[] bookmark = new int[3]
    bookmark[0] = 20;
    bookmark[1] = 30;
    bookmark[2] = 50;

    book.addBookMarks(int[] bookmark);
  }

} // end class Book
```

8. Build a Subclass (10 points)

Examine the Animal class in the appendix. Create a Dog class that is a subclass of Animal. It should have a constructor that accepts both a String name and an int age. It should also implement a "greet" method, which should say "Hi, I'm a dog named <name> and I'm <age> years old".

Appendix: Some methods you may need to use

Picture Class Methods:

Pixel **getPixel**(int x, int y)
Method to get a pixel object for the given x and y location

Pixel[] **getPixels**()
Method to get a one-dimensional array of Pixels for this simple picture

int **getHeight**()
Method to get the height of the picture in pixels

int **getWidth**()
Method to get the width of the picture in pixels

Pixel Class Methods:

void **setRed**(int value)
Method to set the red to a new red value

void **setGreen**(int value)
Method to set the green to a new green value

void **setBlue**(int value)
Method to set the blue to a new blue value

A Sample Class:

```
public class Animal {

  private String name;

  public Animal(String n) {
    name = n;
  }

  public String getName() {
    return(name);
  }

  public void greet() {
    System.out.println("Hi, I'm an Animal named " + name);
  }

} // end class Animal
```