

CS 100 Prelim 2
Summer 2001
Friday, July 20
10:00 – 11:15 a.m.

The pupil who is never required to do what he cannot do,
never does what he can do. – John Stuart Mill

Name: _____

CUID: _____

Statement of Integrity:

I did not, and will not, break the rules of academic integrity on this exam.

(Signature)

First, skim the entire test. Then carefully read all instructions before starting.

- This test is **closed-book**. No calculators, reference sheets, or other materials are allowed.
- Conciseness, clarity, and style count.
- Carefully comment each variable and major control structure.
- Do not use any MATLAB code.
- You may **not** alter, add, or remove code outside of the boxes and blanks.
- If you provide multiple answers, we will only grade one. We will pick which one. (In other words, it is to your advantage to give us just one answer!)

Problem 1: _____ **(10 possible)**

Problem 2a: _____ **(10 possible)**

Problem 2b: _____ **(10 possible)**

Problem 2c: _____ **(10 possible)**

Problem 3: _____ **(10 possible)**

Problem 4: _____ **(20 possible)**

Total: _____ **(70 possible)**

Grader initials

Problem 1: Scoping (10 points)

Read the following Java excerpt.

```
public class Problem1
{
    public static int m = 0;

    public static void main(String args[])
    {
        int i = 0;
        for (int j = 1; j <= 3; j++)
        {
            doStuff(5);
        }
        System.out.println("The value of i is " + i + ".");
        System.out.println("The value of m is " + m + ".");
    }

    public static int doStuff(int j)
    {
        int k = 0, i = 0;
        while (k < j)
        {
            i++;
            m++;
            k++;
        }
        System.out.println("Inside doStuff: the value of i is " + i + ".");
        return i/2;
    }
}
```

What is the output of the above code? (fill in the blanks)

Inside doStuff: the value of i is _____.

Inside doStuff: the value of i is _____.

Inside doStuff: the value of i is _____.

The value of i is _____.

The value of m is _____.

Problem 2: Object-oriented Programming

Part A (10 points): Design Questions

Provide a short answer to each of the following questions. "Short answer" means 1-3 sentences.

1. According to what's been said in lecture or by Savitch, why should instance variables be declared private?
2. What is a default constructor? (How do you know that a constructor is a default constructor, rather than some other kind of constructor? What does a default constructor do?)
3. What is the difference between a class and an object?
4. What does "method overloading" mean?
5. If a method is **not** declared static, can it call other "static" methods? Why or why not?

Part B (5 points correctness, 5 points style): Constructors

Read the following class description and **implement the default constructor**. Then, provide an **additional constructor** of your choice. It should take in at least one argument and do something reasonable (for example, it should use each input argument somewhere in the constructor's body).

```
public class Clock
{
    int hour;
    int minute;
    boolean AM; // true if the time is before noon;
                // false otherwise (noon is 12:00 p.m.; midnight is 12 a.m.)

    // default constructor: set Clock to midnight
    public Clock()
    {

    }

    // constructor: add your constructor here (don't forget comments!)

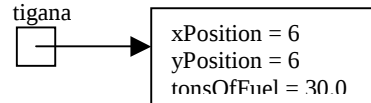
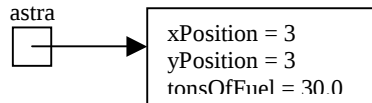
}

}
```

Part C (10 points): References

Read the following code and fill in the blanks with box-and-arrow pictures that indicate what the current **state** of the references (astra and tigana) are. As an example, the first one is done for you. This code is using the original Spaceship class, where the Spaceship's position is represented by two integers (xPosition and yPosition).

```
Spaceship astra = new Spaceship(3, 3);  
Spaceship tigana = new Spaceship(6, 6);
```



```
astra.move(-1, 1);  
tigana.hyperjump(6, 4);
```

```
tigana = astra;  
tigana.move(3, 4);
```

```
astra.hyperjump(12, 5);  
astra = new Spaceship(2, 2);
```

Problem 3: Graphics (10 points)

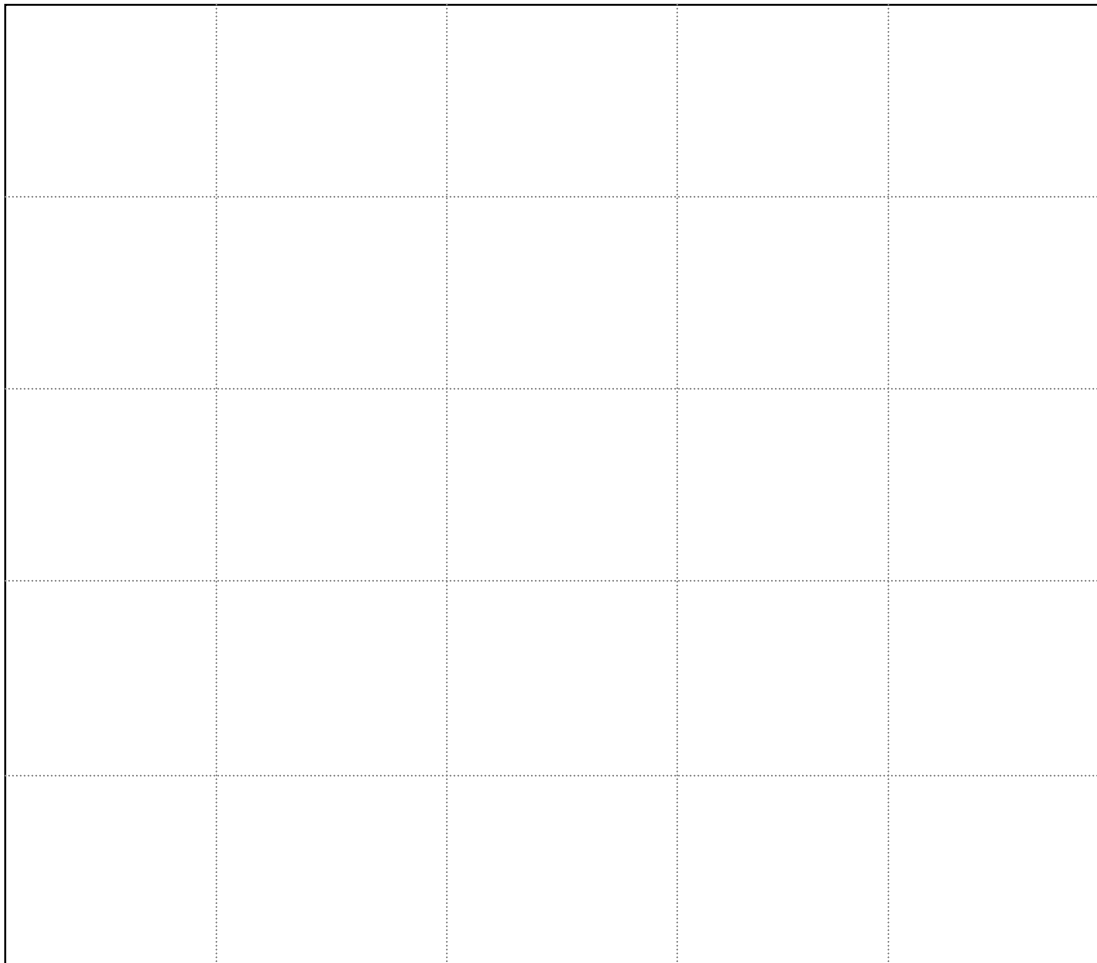
Read through the following paint() method and draw the resulting output in the (500 by 500) box. You may find it helpful to label the dotted lines with numbers.

```
public void paint(Graphics g)
{
    g.drawOval(100, 100, 300, 300);
    g.fillOval(150, 180, 50, 20);
    g.fillOval(300, 180, 50, 20);
    g.drawOval(240, 240, 20, 20);

    g.drawLine(150, 80, 170, 150);
    g.drawLine(150, 80, 130, 150);
    g.drawLine(350, 80, 370, 150);
    g.drawLine(350, 80, 330, 150);

    g.drawArc(150, 250, 100, 100, 0, -90);
    g.drawArc(250, 250, 100, 100, -90, -90);

    g.drawLine(20, 250, 200, 300);
    g.drawLine(20, 300, 200, 300);
    g.drawLine(20, 350, 200, 300);
    g.drawLine(300, 300, 480, 250);
    g.drawLine(300, 300, 480, 300);
    g.drawLine(300, 300, 480, 350);
} // end paint()
```



Problem 4: Arrays (10 points correctness, 10 points style)

Read through the following piece of code.

```
public class Problem4
{
    public static int[] myArray = new int[10];

    public static void main(String args[])
    {
        for (int i=0; i<myArray.length; i++)
        {
            myArray[i] = i + 1;
        }

        doStuff();
    }
}
```

Now, implement a **doStuff()** method for the Problem4 class (it is being called inside main()). doStuff() takes in no arguments and doesn't return anything. The action it takes is to replace each odd integer in **myArray** with twice that odd integer. Remember to **comment** the method properly. **Style** counts!

Final page: Checklist and Feedback

Congratulations! You've completed Prelim 2. If you have some time remaining, use it to go back and check your work. Perhaps you made a small mistake? Here is a list of things to check:

- ___ made all assumptions explicit
- ___ remembered semicolons where appropriate
- ___ filled in all required blanks
- ___ provided comments where appropriate
- ___ declared all variables
- ___ maintained case-sensitivity

Feedback:

Once again we are very interested in hearing how the class is going for you and what we can do to improve it. If you like, answer the following questions. To preserve anonymity, tear this sheet off and give it to the proctor separately.

1. What are 1 to 3 things we can do to improve lecture? (You may also list things you like, as well.)
2. What are 1 to 3 things we can do to improve the class overall? (You may also list things you like, as well.)