

CS 100 Prelim 1
Summer 2001
Monday, July 9
10:00 – 11:15 a.m.

As a final incentive before giving up a difficult task,
try to imagine it successfully accomplished by someone you violently dislike. – K. Zenois

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 Java arrays or 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!)

		Grader initials
Problem 1a:	_____ (10 possible)	_____
Problem 1b:	_____ (10 possible)	_____
Problem 2:	_____ (12 possible)	_____
Problem 3a:	_____ (4 possible)	_____
Problem 3b:	_____ (8 possible)	_____
Problem 3c:	_____ (6 possible)	_____
Problem 4:	_____ (20 possible)	_____
Total:	_____ (70 possible)	_____

Problem 1: Program State and Output

Part A: (10 points)

Read the following Java excerpt.

```
int x = SavitchIn.readLineInt(); // user enters '4' and presses return
int y = 3 * x + 7 / 2;
boolean b = (y - 12 == x);
boolean c = (true && (false || true && (true || !true)));

x = y++ * 2 - x;

System.out.println("The value of x is " + x + ".");
System.out.println("The value of y is " + y + ".");
System.out.println("The value of b is " + b + ".");
System.out.println("The value of c is " + c + ".");
```

What is the output of the above code assuming the user inputs 4? (fill in the blanks)

The value of x is _____.

The value of y is _____.

The value of b is _____.

The value of c is _____.

Part B: (10 points)

Pretend that you are the computer, running the following program. This means you will 'simulate' the behavior of the computer. Next to each line of code that gets executed, write the state of the variables x and y after running that line of code (if a line of code does not get executed, do not write anything in the corresponding blank).

	x	y
int x = 10;	10	
int y = 5;		5
y = x++;	_____	_____
if (y <= x)	_____	_____
{	_____	_____
y = 2 - y * 2;	_____	_____
}		
else		
{		
y = 2 * x - 2;	_____	_____
}		
x = -x + 10 % 5;	_____	_____

Problem 2: Conditional Statements

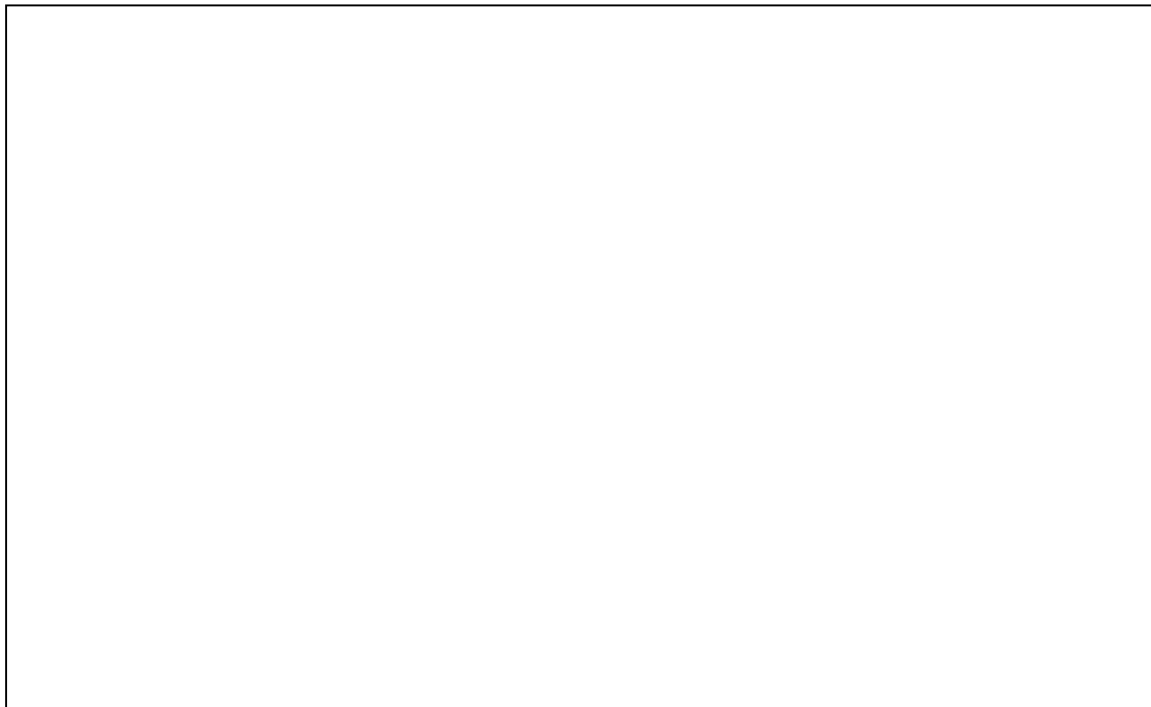
(12 points)

The goal of this part is to come up with a program which, given three integers, outputs the smallest one. You may assume that no two of the three integers will be the same. Your job is to fill in the blank sections (boxes) with Java code. You may not use any methods from the Math class. Remember (as always) to use **good programming style** (comments, variable names, indenting, braces, etc.).

```
int n1, n2, n3;  
int smallest;
```

```
// Read in three integers from the user  
System.out.println("Enter three numbers (ties are not allowed).");  
System.out.println("Enter number 1:");  
n1 = SavitchIn.readLineInt();  
System.out.println("Enter number 2:");  
n2 = SavitchIn.readLineInt();  
System.out.println("Enter number 3:");  
n3 = SavitchIn.readLineInt();
```

```
// Determine which integer is the smallest, and  
// assign "smallest" to have the smallest integer's value.
```



```
System.out.println("The smallest integer is " + smallest);
```

Problem 3: Loops

Part A: (4 points)

We've seen that **for** loops and **while** loops can sometimes be used interchangeably. Explain briefly when you should use a **for** loop, and when you should use a **while** loop.

Part B: (8 points)

In lecture, we listed four important parts of any loop (the postprocessing step is not considered part of the loop). Name the four types and explain what each one does.

1.

2.

3.

4.

Part C: (6 points)

Exercise 4 had you maintain statistics about coin flips. Here is an excerpt from a solution:

```
int numFlips, numHeads = 0, numTails = 0;
// Prompt user for a number from 1 to 100
System.out.println("Enter the number of coin flips (1 to 100):");
numFlips = SavitchIn.readLineInt();

// ----- Begin translation here -----
// Loop the specified number of times
for (int f = 0; f < numFlips; f++)
{
    // This generates a random integer, either 0 or 1.
    // Treat 1 as heads, 0 as tails
    int flip = (int) (Math.random()*2);
    // Update your statistics here:
    if (flip == 1)
    {
        numHeads++;
    }
    else
    {
        numTails++;
    }
}
// ----- End translation here -----
```

Your job is to convert this **for** loop into a **while** loop that executes in exactly the same way (you only need to reproduce the loop; you do not need to copy the variable declarations or the user input part). Be sure to **provide a comment** next to each line you add or change. Write your while loop in this box:

Problem 4: Algorithms

20 points:

- 5 points for Input
- 5 points for Output
- 5 points for Process correctness
- 5 points for Process style (proper level of detail)

You're dissatisfied with the behavior of your spell checker, so you decide you'd like to write a new one. This spell checker will read in a document, use an electronic dictionary to check each word, and output a final error rate (number of misspelled words out of the total number of words). It does not need to do anything with the misspelled words. In addition, you're tired of having to add proper names to the dictionary, so the new spell checker will skip over words that start with capital letters.

Specify an algorithm for the new spell checker. Your algorithm should include Input, Process, and Output components. It should be detailed enough that you (or another programmer) could convert it directly into Java code (thus you can assume that the programmer knows what a word is, what a dictionary is, what a capitalized word is, etc.). For example, if you indicate that a value should be output, you should also include instructions for calculating that value. However, you do **not** need to specify how to check if a given word is in the dictionary. **Number** your steps.

Final page: Checklist and Feedback

Congratulations! You've completed Prelim 1. 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:

We're 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.)