CS-231 Exam 2 Spring 99

1. (6 pts each, 12 pts total) Using Java syntax, write a boolean expression that evaluates to true when
   (a) The number x is outside the range from 15 to 50.
   (b) W is not equal to X or Y

2. (6 pts each, 12 pts total) Assume A and B are boolean variables. Simplify the following boolean expression:
   (a) A && !A
   (b) !( !A || B ) && A
3. (10 pts) Recursion: Write a recursive method `factorial(n)` to compute the factorial of a number `n`. You should not have any loops in your code. For example, to print the factorial of 10, we should be able to write call your recursive method as follows:

```
System.out.println("The factorial of 10 is " + factorial(10));
```

4. (9 pts) What is the output of the following code:

```java
int i, j, t, k = 0;
for (i = 0; i < 10; i++)
{
    for (j = 0; j < 20; j++)
    {
        for (t = 0; t < 30; t++)
            k++;
    }
}
System.out.println("i = " + i +
    " j = " + j +
    " t = " + t +
    " k = " + k );
```
5. (9 pts) What is the output of the code given below for the following values of day (be careful!):

(a) day = 0

(b) day = 2

(c) day = 8

double rate = 0;
switch (day)
{
case 0:
    System.out.println("Case 0");
    rate = 10;
    break;
case 1:
    System.out.println("Case 1");
    rate = 20;
case 2:
    System.out.println("Case 2");
case 3:
    System.out.println("Case 3");
    rate = 40;
case 4:
    System.out.println("Case 4");
    rate = 50;
    break;
case 5:
    System.out.println("Case 5");
    rate = 60;
default:
    System.out.println("default");
}
System.out.println("The rate is " + rate);
6. (20 pts total) Write for-loops to do the following.

(a) (10 pts) Sum the odd numbers in the range from 1 to 100.

(b) (10 pts) First, declare a 2D integer array called `table` with 4 rows and 5 columns. Then, use for-loops to initialize every element of the array `table` to the product of its row and column. For example, `table[3][2]` should be initialized to 6 since 6=3*2.
7. (6 pts each, 18 pts total) Draw a picture of the memory after the following instructions. Include any references (arrows) even if they don't point to anything.

(a) `int [] hours = { 10,3,4,5};`

(b) `int temperatures[][] = new int[3][];`

(c) `Complex c[][] = new Complex[3][2];`  
    `for (int i = 0; i < 2; i++)`  
    `c[1][i] = new Complex();`