Sample Midterm

1. For each of the following, summarize the distinction between the 2 terms. Your answers should be brief:

   a) Internet vs World Wide Web

   b) Program vs Algorithm

   c) In Java, the = operator vs the == operator (Think about how the statement if(a==b) differs from the statement a=b;)

   d) Classes and IDs (in an HTML context)

2. Draw a circle around the portion of the URL that identifies the directory containing the file being addressed. Underline the portion that identifies the file name itself.

   http://batcave.metropolis.com/heroes/superheroes/batpage.html

3. Java supports two kinds of comments.
   - Single-line comments beginning with // and extending to the end of the line
   - Multiple-line comments beginning with /* and extending to */ on the same line or a later line

   What is the purpose of these comments? In other words, what and who are comments for?

4. The following method, floorRoot, was designed to compute the largest integer whose square is no greater than n, where n is assumed to be a positive number. (If n is 5, then the procedure should report the value 2.) Find and correct the error.

   /* returns the largest integer whose square is no greater than n */
   public int floorRoot(int n)
   {
       int x = 0;
       while (x * x <= n)
       {
           x = x + 1;
       }
       return x;
   }
5. Multiple Choice Problems

(i)
What is a void method?
A. A method that does not return a value
B. A method that does not take any parameters
C. A method that does not do anything
D. A method that is invalid and has syntax errors
E. A method that does not ever terminate

(ii)
Given the string s defined as:
String s = "What you really want";
what is s.substring(5,10)?
A. "you really want"
B. "ou really w"
C. "you really "
D. " really "
E. ""
F. error

(iii)
Which of the following RGB values would produce a color that is dominated by red and blue.
1. #ff00ff
2. #121212
3. #125622
4. #1ff11f

(iv)
Given 4 bits, how many values can you represent:
1. 0
2. 4
3. 16
4. 32

6

a. Given the following declarations:
   int p = 2, q = 6, r = 1;
   Evaluate
   p = -1 + p * (2 % q - r);
b. Given the following declaration:
   ```java
   boolean b;
   Evaluate
   b = (10 - 13) <= -3;
   ```

7. Given the following code fragment:
   ```java
   int[] scores = new int[4];
   int k = 0;
   while (k < scores.length)
   {
       scores[k] = k*2;
       k = k + 1;
   }
   ```

What would `scores[1]` evaluate to?
A. 0  
B. 1  
C. 2  
D. 4  
E. unknown  
F. error

8. In any given graph we can assign colors to the vertices of that graph in such a way that if an edge connects two vertices, those vertices have different colors. An easy way to do this would be to assign a unique color to each vertex. Instead, our goal is to color all of the vertices in the graph using as few unique colors as possible. Briefly describe an algorithm that would color a graph using only 2 colors (so that no vertices connected by an edge have the same color) OR would return some error message if it were not possible to color a graph with only 2 colors such that no vertices connected by an edge have the same color. (It may help to first consider an example graph and how you would solve the problem for it.)

(You should know how to check if 2 graphs are isomorphic and what the following terms mean: degree of a node, cycle, tree, height of a tree, depth of a node in a tree, leaves of a tree, complete trees.)
9. The task is to design a method `bigEven` that returns the value `true` if the number it is given is *even* AND is either less than -10 or greater than 10. Clearly circle each method below that correctly meets these qualifications. Assume that the code in each method compiles and runs without errors.

A       public boolean bigEven(int num){
            if(num < 10 && num > -10 && num/2 == 2)
                return true;
            else
                return false;
        }

B       public boolean bigEven(int num){
            if(num > 10 && num > -10 && num%2 == 0)
                return true;
            else
                return false;
        }

C       public boolean bigEven(int num){
            if( (num < -10 || num > 10) && num%2 == 0)
                return true;
            else
                return false;
        }

10. Within the Java method below, write code that will produce an infinite loop that prints the text: "Are we there yet?" in each iteration.

    public static void noEnd() {
    }

11. Fill in the code for the method `evenOdd()` below. The method takes in an array of `int` numbers. Your task is to modify this array's entries. For each entry in the array, double it if the entry's value is an even number. If the entry's value is odd, divide it in half (integer division, please).

    public static void evenOdd(int[] values){
    }