COSC 117 **Exam 2** Fall 2012

Name: _____

Part 1: Definitions & Short Answer (3 Points Each)

1. What Preconditions and Postconditions?

2. What are parameters?

3. What is the difference between formal parameters and actual parameters?

4. What is a return type and where is it designated in the function header?

5. What is the scope of a function parameter?

Part 2: Program Traces (15 Points Each)

1. For each of the program inputs below write the output of the program.

```
import java.util.Scanner;

public class Exam2Trace1 {

   public static int doSomething(int x, int y) {
      while (x != y) {
         if (x > y)
            x -= y;
         else
            y -= x;
      }
      return x;
   }

   public static void main(String[] args) {
      Scanner keyboard = new Scanner(System.in);
      System.out.print("Input x: ");
      int x = keyboard.nextInt();
      System.out.print("Input y: ");
      int y = keyboard.nextInt();

      System.out.println("Result = " + doSomething(x, y));
   }
}
```

(a)

```
Input x: 7
Input y: 9
```

(b)

```
Input x: 25
Input y: 15
```

(c)

```
Input x: -2
Input y: 8
```

2. For each of the program inputs below write the output of the program.

```
import java.util.Scanner;

public class Exam2Trace2 {

    public static void doSomethingMore(int x, int y, int z) {
        z *= y;
        x = -x + z;
        y = 3 * y - 2;
        System.out.println(x + "  " + y + "  " + z);
    }

    public static void doSomething(int x, int y, int z) {
        x += y;
        z = 3 * x;
        y = Math.max(x, y);
        System.out.println(x + "  " + y + "  " + z);
        doSomethingMore(z, y, x);
        System.out.println(x + "  " + y + "  " + z);
    }

    public static void main(String[] args) {
        Scanner keyboard = new Scanner(System.in);
        System.out.print("Input x: ");
        int x = keyboard.nextInt();
        System.out.print("Input y: ");
        int y = keyboard.nextInt();
        System.out.print("Input z: ");
        int z = keyboard.nextInt();

        doSomething(y, x, z);
        doSomethingMore(z, x, y);
        System.out.println(x + "  " + y + "  " + z);
    }
}
```

(a)

```
Input x: 1
Input y: 2
Input z: 3
```

(b)

```
Input x: 3
Input y: 5
Input z: 2
```

(c)

```
Input x: -3
Input y: 2
Input z: 5
```

3. For each of the program inputs below write the output of the program.

```
import java.util.Scanner;

public class Exam2Trace3 {

   public static int alter(int x, int y) {
      int t = 0;
      if (y > 20)
         t = --y;
      else
         t = y++;
      return ++t;
   }

   public static boolean isit(int x, int y) {
      return (3*x < 2*y);
   }

   public static void main(String[] args) {
      Scanner keyboard = new Scanner(System.in);
      System.out.print("Input x: ");
      int x = keyboard.nextInt();
      System.out.print("Input y: ");
      int y = keyboard.nextInt();

      while (isit(x, y)){
         System.out.println(x + "  " + y);
         x = alter(--y, x);
      }
      System.out.println(x + "  " + y);
   }
}
```

(a)

```
Input x: 4
Input y: 15
```

(b)

```
Input x: 2
Input y: 3
```

(c)

```
Input x: -3
Input y: 4
```

Part 3: Coding (10 Points Each)

1. Write a function that rolls two die and returns the sum of the face values. Also write a call for the function that stores the result in a variable called roll.

2. Write a function that takes as input (as a parameter) an average for a student in a class on the 0 – 100 scale and returns the student's letter grade as a character. The grade should be determined on the 90-80-70-60 scale. The function is to return the letter grade to the calling function and not print it out. Also write a call for the function that stores the result in a variable called grade.

3. Write a function called getInteger1_10 that will continually ask the user for an integer in the range from 1 to 10 until the user inputs an integer in this range. The function should then return the input number to the call. The function must also handle any run-time error from user input. Also write a call for the function that stores the input number in a variable called x.

4. Write a function that takes as input (as a parameter) a string and returns the number of vowels in the string. For this function the vowels do not include y. Also write a call for the function that stores the result in a variable called v.

5. Write a function called Area that will take as input (as parameters) the lengths of the three sides of a triangle and return the area of the triangle. Recall that given the lengths of the three sides of a triangle, *a*, *b*, and *c* the area can be found by $\sqrt{s(s-a)(s-b)(s-c)}$ where *s* is the semi-perimeter given by, $\frac{a+b+c}{2}$. Also write a call for the function assuming that the function is contained in a class called Triangle, store the result in a variable named area.