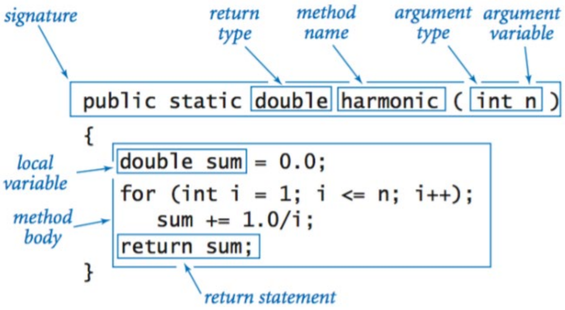
CMSC 113 – COMPUTER SCIENCE 1
Lab#7-Functions – Practice

Task # 1: Review – Terminology: The following shows the anatomy of a typical function (static method). Study the parts carefully and make sure you understand (1) the vocabulary of each part, and (2) the purpose of each part.



```
public static double harmonic ( int n )
{
   double sum = 0.0;
   for (int i = 1; i <= n; i++);
      sum += 1.0/i;
   return sum;
}
```

Some example functions are defined below. For each definition, study the function and confirm the purpose of the function. Also, based on the vocabulary above, make sure that you can identify various parts of a function.

absolute value of an `int` *value*

```
public static int abs(int x) {
   if (x < 0)
      return -x;
   else
      return x;
} // abs()
```

primality test

```
public static boolean isPrime(int n) {
   if (n < 2)
      return false;
   for (int i = 2; i < n/i; i++) {
      if (n % i == 0)
         return false;
   }
   return true;
} // isPrime()
```

uniform random integer in [a, b]

```
public static int randInt(int a, int b) {
   int range = b – a + 1;
   return (int) (a + Math.random() * range);
} // randInt()
```

Task#2: Study the function defined below and then answer the questions that follow:

```
public static void triangle(double x0, double y0,
                            double x1, double y1,
                            double x2, double y2) {
   // Draw a triangle at points (x0, y0), (x1, y1), (x2, y2)
   StdDraw.line(x0, y0, x1, y1);
   StdDraw.line(x1, y1, x2, y2);
   StdDraw.line(x2, y2, x0, y0);
} // triangle()
```

1. What is the name of the function being defined? ____________________

2. How many arguments does the function take? ____________________

3. What is the type of the arguments? ____________________

4. What is the return type of the function? ____________________

5. What is the signature of the function? ____________________

6. Name the local variable defined in the function. ____________________

7. How many commands are in the function body? ____________________

8. Why is there no return statement in this function? ____________________

Task#3: Write, enter, and run a Java program that inputs an integer N from the command line and draws N random triangles on a canvas of 500x500 pixels. To generate the random points, you should use the **`randInt()`** function defined in **Task#1** above. Your program will have the following structure:

```
public class Triangles {
   // Draws several random triangles

   // Define the triangle() function here

   // Define the randInt() function here

   // define the main() function here

} // class Triangles
```

Next, if you have time, modify the program to draw N random triangles in random colors. To create colors beyond the ones defined in the **`StdDraw`** library you can use the Color class from **`java.awt.Color`**. Here is how it is used:

First, you have to import the **Color** class from a Java library. This is done by writing the following command at the very top of your program (prior to defining the class for your program):

```
import java.awt.Color;
class MyProgram {
     …
} // class MyProgram
```

All colors are composed of a combination of three values: red, green, and blue (aka RGB values). Each value can be any integer in the range [0..255]. For example, here are some color values:

- Black: (red:0, green: 0, blue: 0)
- White: (red:255, green: 255, blue: 255)
- Red: (red:255, green: 0, blue: 0)
- Royal Fuchsia: (red:202, green: 44, blue: 146)
- Gold: (red:255, green: 215, blue: 0)
- Khaki: (red: 240, green: 230, blue: 140)
- Bisque: (red: 255, green: 228, blue: 196)
- Lavender: (red: 230, green: 230, blue: 250)
- Honeydew: (red: 240, green: 255, blue: 240)
- Etc.

By choosing random values of red, green, and blue you can create over 16 million colors (256^3)!

To create a new color with specific RGB values, you can write the following command:

```
int red = …
int green = …
int blue = …
Color c = new Color(red, green, blue);
```

You can then use the new color, c to set the pen color:

```
StdDraw.setPenColor(c);
```

Once done, save an image of a sample canvas output in your folder as **Lab7.png** and send it in an e-mail to your instructor.