University of Stirling Computing Science and Mathematics

CSCU9A1 Autumn 2016 Tutorial 2

1. Answer the following questions taken from the exercises in Chapter 2 of Java for Everyone.

   a. What is the value of `mystery` after this sequence of statements?

   ```
   int mystery = 1;
   mystery = 1 - 2 * mystery;
   mystery = mystery + 1;
   ```

   b. What is wrong with the following sequence of statements?

   ```
   int mystery = 1;
   mystery = mystery + 1;
   int mystery = 1 - 2 * mystery;
   ```

   c. Write the following mathematical expression in Java:

   $$s = s_0 + v_0 t + \frac{1}{2} g t^2$$

   d. Write the following Java expression in mathematical notation:

   ```
   dm = m * (Math.sqrt(1 + v / c) / Math.sqrt(1 - v / c) - 1);
   ```

   e. What are the values of the following expressions? In each line, assume that:

   ```
   double x = 2.5;
   double y = -1.5;
   int m = 18;
   int n = 4;

    i.   x + n * y - (x + n) * y
   ii.   m / n + m % n
   ```

   f. What are the values of the following expressions? In each line, assume that:

   ```
   String s = "Hello";
   String t = "World";

    i.   s.length() + t.length()
   ii.   s.substring(1, 2)
  iii.   s.substring(s.length() / 2, s.length())
   ```



```
iv.   s + t
 v.   t + s
```

2. You want to know how many feet are in 3.5 yards, and how many inches are in 3.5 yards. You write the following program for that purpose:

```
public class DistanceConverter
{
   public static void main(String[] args)
   {
      double yards = 3.5;
      double feet = yards * 3;
      double inches = feet * 12;

      System.out.println(yards + "yards are" + feet + "feet");
      System.out.println(yards + "yards are" + inches + "inches");
   }
}
```

   The problem with the program above is that using "magic numbers" makes it hard to maintain and debug. Modify the program so that it uses constants to improve legibility and make it easier to maintain.

3. Can you see any problems with the format of the output from the `DistanceConverter` program? What changes would you make to improve the readability of the output?

4. Answer the following questions taken from the exercises in Chapter 3 of Java for Everyone:

   What is the value of each variable after the `if` statement?

   a.
   ```
   int n = 1; int k = 2; int r = n;
   if (k < n) { r = k; }
   ```

   b.
   ```
   int n = 1; int k = 2; int r;
   if (n < k) { r = k; }
   else { r = k + n; }
   ```

   c.
   ```
   int n = 1; int k = 2; int r = k;
   if (r < k) { n = r; }
   else { k = n; }
   ```

   d.
   ```
   int n = 1; int k = 2; int r = 3;
   if (r < n + k) { r = 2 * n; }
   else { k = 2 * r; }
   ```

