COSC1073 - Programming 1

TuteLab 1 – Types and Expressions and I/O

Tutorial Questions

1. Give appropriate declarations for variables used to store the following values:
   a. An employee's salary

   float salary;

   b. The month number within a year

   byte month;

   c. An employee identification number

   String employeeNumber; // since could be alphanumeric

   d. The constant string "Hello"

   static final String HELLO_STRING = "Hello";

   e. The capacity of a tank in cubic cm

   int tankVolume;

   f. The conversion factor from $AUS to $US

   float fxFactor;

2. What is the output of the following statements:

```
a. System.out.print(10.0 / 3.0 + 5.0 * 2.0);
13.333333333333334
b. System.out.println(10 - 3 % 5 * 2);
4
c. System.out.print(10 / 3 + 5 / 2);
5
d. System.out.println(13 % 5 / 2);
1
e. System.out.print((10 + 3 / 2) * 3);
33
f. System.out.println(5.0 % 3.0);
2.0
```

3. What is the value of a in the following (assume a is int)?

```
a. a = 45 / 8 * 4 + 2;
```

22

```
b. a = 17 + (21 % 6) * 2;
```

23

```
c. a = (4 * 2 + 2) * 2;
```

20

4. Recalculate the results for expressions b and c above – are either of these expressions evaluated differently without the parentheses (round brackets)?

```
b. a = 17 + 21 % 6 * 2;
```

23

```
c. a = 4 * 2 + 2 * 2;
```

12

For (b) the parenthesis (round brackets) did not matter, for (c) the parenthesis did make a difference (due to the order of operations).

5. What is wrong with the following expressions, one trying to compute the area of a semicircle and the other trying to compute the positive root of a quadratic equation? How do we fix these problems?

```
areaSemiCircle = 1/2 * Math.PI * r * r;
root1 = (- b + Math.sqrt(b*b - 4*a*c)) / 2 * a;
```

For areaSemiCircle due to the 1 / 2 using returning an integer instead of 0.5 being returned, 0 is returned which results in the final result always being 0. One way to fix this is to change 1 / 2 into a double, for example 0.5:

```
areaSemiCircle = 0.5 * Math.PI * r * r;
```

For roo1 the 2 * a requires parenthesis, otherwise the left-hand side is divided by 2 then multiplied by a, rather than being divided by 2 multiplied by a.

```
root1 = (- b + Math.sqrt(b*b - 4*a*c)) / (2 * a);
```

6. Which of the following expressions are equivalent to the statements below:

```
y = x;
x = x+1;

a. y = x++;   b. x = y++; c. y = ++x; d. x = ++y;
```

The only equivalent statement is (a).

7. Let y have the value 5 and z have the value 8. What are the values of x, y and z after each line of the following fragment?

```
a. x = y++ + z++;
x = 13, y = 6, z = 9
b. x = y++ + ++z;
x = 14, y = 6, z = 9
c. x = ++y + z++;
x = 14, y = 6, z = 9
d. x = ++y + ++z;
x = 15, y = 6, z = 9
```

8. What will be the output of the program below given the input below?

```
import java.util.Scanner;

public class ScannerDemo2
{
  public static void main(String[] args)
  {
        Scanner keyboard = new Scanner(System.in);
        double n1 = keyboard.nextDouble();
        double n2 = keyboard.nextDouble();
        String message = keyboard.nextLine();
        System.out.printf("n1 = %8.2f n2 = %8.2f message = %10s",
              n1, n2, message);
  }
}
```

INPUT (3 lines):

12.5
13.5
This is the end

n1 = 12.50 n2 = 13.50 message =

The input for message is missed due to a mishandling of not flushing the input buffer after reading a double and calling nextLine() to get input afterwards. To fix this flush the buffer after each non-nextLine() call as such:

```
import java.util.Scanner;

public class ScannerDemo2
{
  public static void main(String[] args)
  {
        Scanner keyboard = new Scanner(System.in);
        double n1 = keyboard.nextDouble();
        keyboard.nextLine(); // Flush scanner buffer.
        double n2 = keyboard.nextDouble();
        keyboard.nextLine(); // Flush scanner buffer.
        String message = keyboard.nextLine();
        System.out.printf("n1 = %8.2f n2 = %8.2f message = %10s",
              n1, n2, message);
  }
}
```

n1 = 12.50 n2 = 13.50 message = This is the end