ECS717/ECS705

Lab Sheet 2: Control Structures and Methods

Essential exercises:

Exercise 8.
Below is a Java Program using a while loop:

```
/**
 *  Cubes: Loop demonstration: while loop
 */
public class Cubes {
    public static void main (String[] args){
        int i = 1;
        while (i < 10){
           System.out.println("The cube of " + i + " is "+ i * i * i);
           i++;
        }
    }
}
```

a) Write a new version of this program using a *do-while* loop. Name it *Cubes1.java*
b) Write a new version of this program using a *for* loop. Name it *Cubes2.java*

Note: The three programs must produce the same output.

Exercise 9.

Write a program that accepts two integer values from the command line to represent a range. Issue an error message if the second value is not greater than the first. Otherwise, calculate the sum of the integers in that range (inclusive).

Exercise 10.

Write a Java program called *Pattern.java* using **nested loops** that print the following pattern. The number of rows should be taken from the command line argument. E.g. java Pattern 5 should give the following output:

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Exercise 11.

Using your answer from Exercise 10, complete the code below. This class does the same thing as Exercise 10, however the code to print the pattern is not directly written in the `main` method. Instead, it is written in the method

`public static void printPattern(int n)` – n is the input number.

The main method of this class should call the method.

```
public class PatternMethod{
    public static void printPattern (int n){
        //write your code here (taken from your solution of question 3)
    }

    public static void main (String[] args){
        //write your code here
    }
}
```

Exercise 12.

Rewrite Exercise 10 *without* using nested loops. Use a single loop and some (basic) string wizardry instead. Which of these two implementations is more efficient, and why?

Desirable exercises:

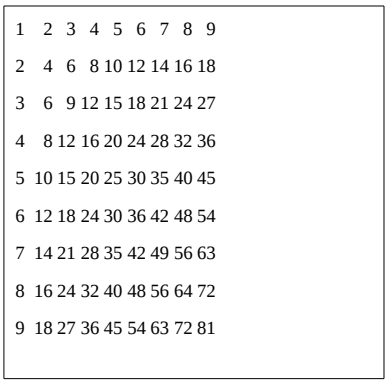
Exercise 13.

Write a program that displays triangle made up of asterisk symbols by given n (n is taken from the command line argument). The output of the program should look something like this if n=5.

```
    *
   **
  ***
 ****
*****
```

Exercise 14.

Write a Java program that produces a multiplication table, showing the results of multiplying the integer 1 through 9. Note the format: the numbers should be *aligned to the right*.



Optional exercises:

Exercise 15.

Write a program to calculate the factorial of a number. The factorial of a number n is defined as n × (n – 1) × (n – 2) × (n – 3) × …× (1). So for example, the factorial of 8 is 8 × 7 × 6 × 5 × 4 × 3 × 2 × 1 = 40320. There is a special case in factorial, which is that the factorial of 0 is 1.