UNIVERSITY OF RUHUNA
BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY
Practical 02

ICT2132 – Object Oriented Programming Practicum **TIME: 04 Hours**

1. Write simple programs to display the following styles on the console.
   Hint: use 'for' loops.

   a.
   ```
   *
   * *
   * * *
   * * * *
   ```

   b.
   ```
   #
   # #
   # # #
   # # # #
   ```

   d.
   ```
   *
   * *
   * * *
   * * * *
   * *
   * *
   ```

   c.
   ```
   *
   * *
   * * *
   * * * *
   * * * * *
   ```

2. Write a Java program to generate a pyramid of * when a number is input to the program. Ex. If the input number is 5, the output should be as follows,

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

3. Write a Java program to calculate the area of following shapes,
   1. Square
   2. Circle
   3. Rectangle
   4. Cylinder

   According to your choice, when you enter the relevant number of the figure, the program should read the necessary values and display the area of the figure. (Hint: Use the switch/case statement)

   Area of a square is = length* length

   Area of a circle is = (22/7) * radius * radius

   Area of a rectangle is = side1* side 2

   Area of a cylinder is = 2 * (22/7) * radius * height

   Note : Get inputs for relevant parameters)

4. Write a java program with three local int variables a, b, and c that sorts these three values in ascending order by comparing and exchanging their values. At the end of the program a <= b <= c must hold.

5. Write a java program to print a message based on the value of the temperature. Use the following table.

Temperature (t)	*Message*
30<t	Hot
20<t<= 30	warm
10<t<=20	fine
t<=10	cold

6. Write a method which returns the name of the appropriate month when a number from 1-12 given as a parameter.

7. Write a method which determines whether any given integer as parameter is odd or even.

8. Write a program called **SumAndAverage** to produce the sum of 1, 2, 3, ..., 100 using for loops. Also compute and display the average. The output shall look like:

   The sum is 5050
   The average is 50.5

9. Modify the above program to use a "while" loop instead of "for" loop.

10. Modify the above program to use a "do-while" loop.

11. Write a program called **`Product1ToN`** to compute the product of integers 1 to 10 (i.e., 1×2×3×...×10).
    a. Modify your program to get the product between given two numbers
    (i.e. if given 5 and 10 5x 6x 7x 8x 9x 10

12. Write a program to get factorial of a given number.
    4! = 4x3x2x1 = 24

13. Print Fibonacci Series for a given user input.
    Ex: user giving 15, need to print 0 1 1 2 3 5 8 13 21 34 55 89 144 233 377

14. Write a program called **HarmonicSum** to compute the sum of a harmonic series, as shown below, where n=50000. The program shall compute the sum from left-to-right as well as from the right-to-left.

$$Harmonic(n) = 1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$$

15. Write a program called **MultipleFinder** which prints the numbers 1 to 50, one number per line. The program shall print "Three" in place of the numbers which are multiples of 3, "Five" for multiples of 5, "Seven" for multiples of 7, "ThreeFive" for multiples of 3 and 5, and so on. (ex. For the value 3, system should print “three”, for the value 15 system should print “ThreeFive”)

16. Write a method to print the following pattern using nested-loops in a class called Triangles.
    The signatures of the method is:
    void PowerOf2Triangle (int)
    Write the main() which prompts the user for the numRows and prints the pattern.

```
                    1
                  1  2  1
               1  2  4  2  1
            1  2  4  8  4  2  1
         1  2  4  8 16  8  4  2  1
      1  2  4  8 16 32 16  8  4  2  1
   1  2  4  8 16 32 64 32 16  8  4  2  1
1  2  4  8 16 32 64 128 64 32 16  8  4  2  1
```

17. Write a program called **`MultiplicationTable`** to produce the multiplication table of 1 to 9 as shown using two nested for-loop

```
 * |  1  2  3  4  5  6  7  8  9
 ----------------------------
 1 |  1  2  3  4  5  6  7  8  9
 2 |  2  4  6  8 10 12 14 16 18
 3 |  3  6  9 12 15 18 21 24 27
 4 |  4  8 12 16 20 24 28 32 36
 5 |  5 10 15 20 25 30 35 40 45
 6 |  6 12 18 24 30 36 42 48 54
 7 |  7 14 21 28 35 42 49 56 63
 8 |  8 16 24 32 40 48 56 64 72
 9 |  9 18 27 36 45 54 63 72 81
```

18. Implement a Java program that prints out the day of the week for a given day (1..31), month (1..12) and year.

    The day of the week of dates between March 1900 and February 2100 can be calculated as follows:

    First, you have to calculate the total number of days from 1900/1/1 to the given date (see below, for details). Secondly, you divide this number by 7 with integer remainder: this now is the day of the week, with 0 as sunday, 1 as monday, etc.

    To calculate the total number of days you have to implement the following steps:

    Subtract 1900 from the given year and multiply the result by 365
    Add the missing leaps years by adding (year - 1900) / 4.
    If the year itself is a leap year and the month is January or February, you have to subtract 1 from the previous result.
    Now add all days of the year up to the given one to the result (in case of february always 28, because the additional day for a leap year already have been added).

    Here some dates with the day of the week for testing your Java program:

    Sunday: 1916/3/23, 2007/4/8, 2010/4/4
    Wednesday: 2006/3/1, 2007/2/21, 2010/2/17

19. Write a program that reverse a user given string.
    Ex: java → avaj

20. A palindrome is a word which reads the same backward or forward. Write a program that detects if a user given string is a palindrome.
    Ex: racecar → racecar

21. Write a Java program called CaesarCode to cipher the Caesar's code. The program shall prompt user for a plaintext string consisting of mix-case letters only; compute the ciphertext; and print the ciphertext in uppercase.

    For example,
    Enter a plaintext string: Testing
    The ciphertext string is: WHVWLQJ

    (Hint: Caesar's Code is one of the simplest encryption techniques. Each letter in the plaintext is replaced by a letter some fixed number of position (n) down the alphabet cyclically. In this exercise, we shall pick n=3. That is, 'A' is replaced by 'D', 'B' by 'E', 'C' by 'F', ..., 'X' by 'A', ..., 'Z' by 'C'.)

22. Write a program called DecipherCaesarCode to decipher the Caesar's code described in the previous exercise. The program shall prompt user for a ciphertext string consisting of mix-case letters only; compute the plaintext; and print the plaintext in uppercase.

    For example,
    Enter a ciphertext string: wHVwLQJ
    The plaintext string is: TESTING

23. Write a Java program called ExtractDigits to extract each digit from an int, in the reverse order. For example, if the int is 15423, the output shall be "3 2 4 5 1", with a space separating the digits.

24. Write a Java program called “IncomeTaxCalculator” to calculate yearly income tax of a Sri Lankan Individual.

Taxable Income	**Rate**
First Rs. 600,000/-	4%
Next Rs. 600,000/-	8%
Next Rs. 600,000/-	12%
Next Rs. 600,000/-	16%
Next Rs. 600,000/-	20%
On Balance	24%

25. Write a program called Bin2Dec to convert an input binary string into its equivalent decimal number. Your output shall look like:
    Enter a Binary string: 1011
    The equivalent decimal number for binary "1011" is: 11

    Enter a Binary string: 1234
    error: invalid binary string "1234"