

Programming – TU856/1 & TU858/1

Lab 5 – Tuesday, November 1st, 2022

Note: You are expected to finish all programmes in your own time if you do not get these done during the lab session. This is your own responsibility.

Iteration – Loops (while, do....while, for)

Write separate programs to:

1. Write a program using a *while* loop to display the numbers 1 - 10 in descending order on the same line and each number separated by a comma e.g., 10,9,8,7,6,5,4,3,2,1

Note: **don't** display the comma after the last number.

2. Write a C program that will input a positive integer value, and compute the following sequence:

*if the number is even, halve it
if the number is odd, multiply by 3 and add 1.*

Repeat this process until the value is 1, displaying each value. Finally display how many of these operations you performed.

Typical output might be:

```
Initial value is 9
Next value is 28
Next value is 14
Next value is 7
Next value is 22
Next value is 11
Next value is 34
Next value is 17
Next value is 52
Next value is 26
Next value is 13
Next value is 40
Next value is 20
Next value is 10
Next value is 5
Next value is 16
Next value is 8
```

```
Next value is    4
Next value is    2
Final value 1, number of steps 19
```

Note: If the input value is less than 1, display a message containing the word "Error" and ask to re-enter another number.

3. Write a program that asks the user to enter a number between 1 - 5. Your program should display all the numbers between 1 - 20 that are **evenly divisible** by this number. You will need to use a loop.
4. Write a program that counts from one to ten, prints the values on a separate line for each, and prints a message stating, "This number is three" and "This number is seven" when the count is 3 and when the count is 7 respectively.
5. Using a loop, display all the **even** numbers from 1 - 100, separated by commas (*Hint:* use the modulus operator, i.e., %)
6. Q6 (see below)

NB: Use comments, white-space and indent your code.

```

    total += n ;
    i++ ;
}

```

4. What is displayed when the following program is run and the number 1234 is entered?

```

#include <stdio.h>
main()
{
    int num ;
    printf( "Please enter a number " ) ;
    scanf( "%d", &num ) ;
    do
    {
        printf( "%d", num % 10 ) ;
        num /= 10 ;
    }
    while ( num != 0 ) ;
}

```

5. Write a program that allows a teacher to enter a percentage mark for each student in a class. The teacher enters a negative mark to indicate that there are no more marks to be entered. Once all the marks have been entered, the program displays the average percentage mark for the class.
6. Write a program to find the sum of all the odd integers in the range 1 to 99.
7. Write a program to display all the hour and minute values in a 24-hour clock, i.e. 0:01 0:02 ... 12:59 0:00. How would you display the values in fifteen-minute intervals?
8. Write a program to display a Christmas tree.

```

      *
     ***
    *
   ***
  *****
   *
  ***
 *****
*****
 |
====V====

```

The tree consists of a series of tiers of increasing size. There are three tiers in the tree above. The program inputs the number of tiers from the keyboard.