Programming – TU857/1

Lab 5 – Monday, October 23rd, 2023

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: **do not** display the comma after the last number.

2. **Mandatory Exercise Question – You must complete and Demo to your Lab TA**

   Write a C program where the user enters 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.

   (i) Repeat this process until the value is 1, displaying the current value each time.
   (ii) Display the number of times the process in part (i) above was performed.

   Typical output might be:

```
Value entered 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 user enters an initial value 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 is 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.