Date: 20.04.2022

Due: 27.04.2022

EEF110E – INTRODUCTION TO PROGRAMMING LANGUAGE (C)
HOMEWORK – I

1- Write a program that takes the temperature values for each day of January from the user in the main function.

- Write functions to find the lowest and highest temperatures and the dates when these temperature values were measured (such as January 13).
- Write a function that finds the average temperature for January and the date the closest temperature to the average was measured.
- Print the array of all temperatures, lowest, highest and average temperatures with the corresponding days to the screen. The output of this part could be similar to Figure 1. The part that takes the temperature values from the user is not included in Figure 1, but keep in mind that it should be in yours.

```
Jan,  1: 12.50
Jan,  2: 13.20
Jan,  3: 10.00
Jan,  4:  9.60
Jan,  5: 12.30
Jan,  6: 15.50
Jan,  7: 11.10
Jan,  8: 14.40
Jan,  9: 12.00
Jan, 10: 17.20
Jan, 11: 17.90
Jan, 12: 16.50
Jan, 13: 16.20
Jan, 14: 13.90
Jan, 15: 10.20
Jan, 16:  7.50
Jan, 17:  3.50
Jan, 18:  3.00
Jan, 19:  2.80
Jan, 20:  2.40
Jan, 21:  1.90
Jan, 22:  0.00
Jan, 23: -1.00
Jan, 24: -3.00
Jan, 25: -1.50
Jan, 26:  0.40
Jan, 27:  3.70
Jan, 28:  5.60
Jan, 29:  7.20
Jan, 30:  7.90
Jan, 31: 10.30
Average is 8.17 degrees and closest day is Jan, 30
Lowest is -3.00 degrees on Jan, 24
Highest is 17.90 degrees on Jan, 11
```

Figure 1: Output example for Q1

2- Taylor series approximation formula for the cosine function is given as follows.

$$\cos(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!}$$

Using above formula, define a function

int CosApprox(**double** x, **double** e);

whose properties are summarized as below;

- This function takes two inputs; **x** is the angle in **radians** and **e** is the error tolerance.
- Return value of the function is the number of terms (**n**) which satisfies the desired error tolerance.
- Test the function by giving 4 different values for **x** and **e**. Show the obtained results in a table (Please note that you can use the difference between the values of the cos(x) function in the <math.h> library and the cosine value calculated using above formula to find the approximation error).
- The output of your program could be similar to Figure 2.

```
Angle in radians: 1.047198
Angle in degrees: 60.000000
Error tolerance: 0.001000

Real value: 0.500000
Approximate value: 0.499965
Number of terms: 3
```

Figure 2: Output example for Q2

3- Write a program using a **recursive** function that gives the sum of the numbers up to **n**, which is taken from the user with the help of scanf() function. Test the function for several "n" values (Do not use the formula $\frac{n(n+1)}{2}$).