

**Sofia University**  
**Department of Mathematics and Informatics**

Course : **OO Programming C#.NET**

Date: **October 15, 2022**

Student Name:

**Lab No. 3a- methods**

**Submit the all C# .NET files developed to solve the problems listed below. Use comments and Modified-Hungarian notation.**

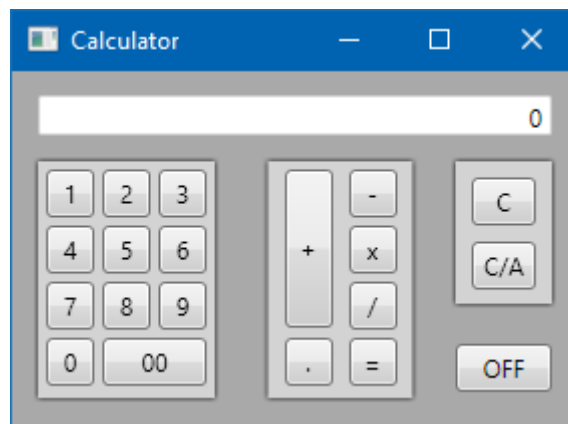
**Problem No. 1**

Write a **WPF application** to implement the **functions** and **user interface** of a **calculator**

i.e. there should be:

- a) all the arithmetic operations
- b) memory store, clear, add, subtract
- c) mathematical functions for  $EXP()$ ,  $SIN()$ ,  $COS()$ ,  $SQRT()$ ,  $LOG()$  and  $1/x$

Make use of *enum* types to denote arithmetic and memory operations. Accordingly, use these *enum* constants in a switch command to execute the calculator operations.



**Problem No. 2**

Write a **Console application** that computes the value of  $\cos(x)$  by using the formula:

$$\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$$

with accuracy  $0 < \varepsilon < 1$  provided as user input. Compare the result with the value returned by the **respective static method** in the **Math** class. Output the approximate and the accurate value, as well as, the given accuracy using formatted numeric output.

**Problem No. 3a**

Write a method to determine, if the **integer** arguments  $x$  and  $y$  have a **common divisor**. If so, return the least and **greatest common divisor** as *out* parameters.

**Write a Console application** to test the method.

### **Problem No. 3b**

Write a method to compute the probability a set of five- digit numbers divide by the number 4.

The set of five-digit numbers is the following:

- the first digit is in the interval [1,5]
- the second digit is in the interval [4,9]
- the third digit is in the interval [3,8]
- the fourth digit is in the interval [6,9]
- the fourth digit is in the interval [2,8]

**Write a Console application** to test the method.

### **Problem No. 4**

(*Pythagorean Triples*) Some right triangles have sides that are all integers. A set of three integer values for the sides of a right triangle is called a Pythagorean triple. These three sides must satisfy the relationship that the sum of the squares of the two sides is equal to the square of the hypotenuse.

Write a method to find and display in columns all Pythagorean triples for ***side1***, ***side2*** and ***hypotenuse***, none larger than **30**. Use a triple-nested ***for*** loop that tries all possibilities. This is an example of “*brute force*” computing. You will learn in more advanced computer science courses that there are some problems for which there is no known algorithmic approach other than using sheer brute force.

Write a **Console application** to test the designed method.