

**THE HONG KONG POLYTECHNIC UNIVERSITY**  
**Department of Electronic and Information Engineering**

**Computer Programming (ENG236) - Homework 2**

- A. By using Visual Studio .NET, implement all member functions of the class `Calculator` based on the class specification as given below. Then develop a console application that will:
1. Create an object of the class `Calculator` with input parameter equal to your student ID no.
  2. Call the member functions `menu()`, `obtainUserInput()` and `calculating()` of `Calculator` one by one to show the implementation of these member functions is correct. You can call the functions any way you want as long as they can show their implementation meeting all the requirements in the specifications.

```
// The class Calculator is defined as follows:
// (Words started with $ refer to the member variables as stated in the
// private section)
class Calculator
{
public:
    Calculator(int studentid); //Constructor
    // When the object is instantiated, save the input parameter, i.e.
    // $user_number = studentid (excluding the first 0 and the last alphabet)
    // For other member variables, initialize them to 0
    // Also, show the following message "xxxxxxx, welcome to use
    // Calculator!!!", where xxxxxxx is the value of studentid

    ~Calculator();
    // Destructor. Do nothing.

    bool menu();
    // The following menu should be shown when menu() is called
    // Calculator Menu
    // 1. Calculate the power
    // 2. Calculate the factorial
    // 3. Calculate the exponential function
    // 4. Show current result
    // 5. Quit
    // Allow the user to select any one of the above choices.
    // If the user enters 1 to 4, save the number to $operation. Return true
    // If the user enters 5, save the number to $operation. Return false

    void obtainUserInput();
    // If $operation = 1 or 3, ask user to enter two numbers.
    // $input1 = the first number entered by user in double form.
    // $input2 = the second number entered by user in integer form.
    // If $operation = 2, ask user to enter 1 number.
    // $input2 = the number entered by user in integer form.
    // For other operations, do nothing

    double calculating();
    // If $operation = 1, return $input1 to the power of $input2, i.e
    // $input1$input2; save the result to $calculate_result
    // If $operation = 2, return the factorial of $input2, i.e. $input2!;
    // save the result to $calculate_result
    // If $operation = 3, return the exponential function of $input1 using the
    // the following formula:
    // 1 + $input1 + $input12/2! + $input13/3! + ... + $input1$input2/$input2!
    // Save the result to $calculate_result
    // If $operation = 4, show the current value of $calculate_result.
    // and return 0
    // If $operation = 5, show a message: "Goodbye xxxxxxx!",
    // where xxxxxxx is the value stored in $user_number;
    // then return 0

    int getuser_number() const; // return the value of $user_number
    int getoperation() const; // return the value of $operation
}
```

```

    double getcalculate_result() const;    // return the value of
$calculate_result
    double getinput1() const;    // return the value of $input1
    int getinput2() const;    // return the value of $input2
private:
    int user_number;    // Store the studentid number
    int operation;    // Indicate the operation selected.
                        // 1 = power; 2 = factorial; 3 = exponential;
                        // 4 = show result; 5 = quit
    double calculate_result;    // Keep the result of the calculation
    double input1;    // Keep the first input of the user
    int input2;    // Keep the second input of the user
};

```

B. By using Visual Studio .NET, develop a static library, namely `EIE_Calculator.lib`, based on the class specification as given in part A.

C. By using the static library you developed in part B, develop a console application in Visual Studio .NET such that it will first give a welcome message to the user and ask the user to enter his studentID (excluding the first 0 and the last alphabet). It will then repeatedly show the following menu:

```

Calculator Menu
1. Calculate the power
2. Calculate the factorial
3. Calculate the exponential function
4. Show current result
5. Quit

```

If the user chooses 1, your program should allow the user to enter a double number A and an integer B and then compute the result of  $A^B$ .

If the user chooses 2, your program should allow the user to enter an integer B and then compute the factorial of B, i.e.  $B! = B \times (B-1) \times (B-2) \times \dots \times 1$ .

If the user chooses 3, your program should allow the user to enter a double number A and an integer B and then compute the result using the following formula:

$$\text{result} = 1 + A + \frac{A^2}{2!} + \frac{A^3}{3!} + \dots + \frac{A^B}{B!}$$

If the user chooses 4, the result of the last operation selected by the user is shown.

If the user chooses 5, show a message "Goodbye xxxxxxx!", where xxxxxxx is your student ID (excluding the first 0 and the last alphabet); and then the program quits.

When doing the computation as mentioned above, it is compulsory to use the member functions of your library whenever applicable.

## Instructions

1. It is compulsory to use a new project for each question.
2. Try to explain your program as clear as possible using comments.
3. Apart from `iostream`, do NOT use any other standard library provided by Visual Studio.
4. The program structure will be an important part when assessing your work. Never try to write your program with a single `main()` function. To improve the program structure, it is allowed to add more member functions into the class.