CL-1002
Programming Fundamentals
Lab # 15

Objectives:

- Functions c++ programs

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function about its functionality.
3. Use understandable name of variables.
4. Proper indentation of code is essential.
5. Write a C++ statement(s) for each of the following task one after the other, in the same order.
6. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of **every task output in MS word and submit .cpp file with word file**.
7. Make separate .cpp files for all tasks and use this format **23F-1234_Task1.cpp.**
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google classroom. (Make sure your submission is completed).
11. Please submit your word file in this format **23F-1234_L1.docx**
12. Do not submit your assignment **after the deadline**.
13. **Do not copy code from any source otherwise you will be penalized with negative marks.**

Problem: 1 | Pass by value

Write a program that uses the function **isNumPalindrome**. Test your program on the following numbers:
10, 34, 22, 333, 678, 67876, 44444, and 123454321.

Problem: 2 | Pass by value

Given a number N. The task is to write a program to find the Nth term in the below series:
3, 6, 18, 24, 45, 54...(Nth term)
Examples:
Input: N = 5
Output: 45
Explanation:
For N = 5,
Nth term = (N * ((N/2) + ((N%2) * 2) + N)
= (5 * ((5/2) + ((5%2) * 2) + 5)
= (5 * (2 + (1 * 2) + 5)
= 45
Input : 6
Output : 54
Generalized Nth term of this series:
Nth term = (N * ((N/2) + ((N%2) * 2) + N)
Make a value returning function called nthTerm(int N) where N is the term you find to find in the above series. Return the Nth term if found.

Problem: 3 | Factorial using value returning function

We have to write a C++ program to find out the factorial of a given number using iteration in mathematics, the factorial of a positive integer n, denoted by n!, is the product of all **positive** integers less than or equal to n.
For example,
5! = 5 * 4 * 3 * 2 * 1 = 120
The value of 0! is 1, according to the convention for an empty product.
NOTE: Factorial is calculated only for non-negative integers.
Expected Input and Output
Case 1. When we take a positive integer
If the input number is 5,
then the expected output will be 120.
Case 2. When the number is zero.
If the input number is 0,
then the expected output will be 1.

Problem: 4 | Find max

In this programming example, the function larger is used to determine the largest number from a set of numbers. For the purpose of illustration, this program determines the largest number from a set of 10 numbers. You can easily enhance this program to accommodate any set of numbers.

Input	A set of 10 numbers.
Output	The largest of 10 numbers.

PROBLEM ANALYSIS AND ALGORITHM DESIGN

Suppose that the input data is:

15 20 7 8 28 21 43 12 35 3

Read the first number of the data set. Because this is the only number read to this point, you may assume that it is the largest number so far and call it max. Read the second number and call it num. Now compare max and num and store the larger number into max. Now max contains the larger of the first two numbers. Read the third number. Compare it with max and store the larger number into max. At this point, max contains the largest of the first three numbers. Read the next number, compare it with max, and store the larger into max. Repeat this process for each remaining number in the data set. Eventually, max will contain the largest number in the data set. This discussion translates into the following algorithm:

1. Read the first number. Because this is the only number that you have read so far, it is the largest number so far. Save it in a variable called max.
2. For each remaining number in the list:
a. Read the next number. Store it in a variable called num.
b. Compare num and max. If max < num, then num is the new largest number, so update the value of max by copying num into max. If max >= num, discard num; that is, do nothing.
3. Because max now contains the largest number, print it.

To find the larger of two numbers, the program uses the function larger

Problem: 5 | swap a number

Write a C++ program to swap two numbers using pass by value.

You should have the following function in your program.

void swap(int x, int y)

Problem: 6 |

An integer is said to be a perfect number if the sum of its divisors, including 1 (but not the number itself), is equal to the number. For example, 6 is a perfect number, because 6 = 1 + 2 + 3. Write a function isPerfect(int no) that determines whether parameter number is a perfect number. Use this function in a program that determines and prints all the perfect numbers between 1 and 1000. Print the divisors of each perfect number to confirm that the number is indeed perfect.

Problem: 7 |

Write a value-returning function, isVowel, that returns the value true if a given character is a vowel and otherwise returns false

Problem: 8 | Guess-the-Number Game

Write a program that plays the game of “guess the number” as follows: Your program chooses the number to be guessed by selecting an integer at random in the range 1 to 1000. The program then displays the following:

I have a number between 1 and 1000.
Can you guess my number?
Please type your first guess.

The player then types a first guess. The program responds with one of the following:

1. Excellent! You guessed the number! Would you like to play again (y or n)?
2. Too low. Try again.
3. Too high. Try again.

If the player’s guess is incorrect, your program should loop until the player finally gets the number right. Your program should keep telling the player Too high or too low to help the player “zero in” on the correct answer. Write a function that checks the number is correct, too high or to low. Also find the count of the number of attempts to find a right number. Use the concept of pass by value.

Best of luck

You are done with your exercise, submit on classroom at given time.