



CL-118
Programming
Fundamentals Lab # 17

Objectives:

- Practice and understanding on basic c++ programs
- Arrays
- Pre-Defined Functions
- User Defined functions

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

1. Use proper **font family (Calibri or Times New Roman)** and **font size** of the **title (16 points)**, **heading (14 points)**, **subheading (12 points)**, and **normal text (10 points)**.
2. First think about the problem statement and then write/draw your logic on paper.
3. **Microsoft Visual Studio** should be used to make c++ programs. Programs made with any other software would not be accepted.
4. For each task in the manual create a new C++ program with the naming convention as follows:
TASK-NO
5. **Mention what is happening in each line of code using comments.**
6. Write all codes one by one with proper numbering and also paste screen shot of each problem using the **snipping tool** (default screen capture software in windows) on **Microsoft word file**.
7. Please submit your file with this naming convention
ROLLNO_SECTION_GROUPNO_LABNO.
8. **Do not copy from any source otherwise, you will be penalized with zero marks.**
9. Submit your lab on **Google Classroom**.

Problem: 1 | Function Overloading

Write a program with three functions having the same name "sum"

- The first function takes two int parameters, adds them together, and then returns an int sum
- The second function takes two float parameters, adds them together, and then returns a float sum
- The third function takes three int parameters, adds them together, and then returns an int sum.

The program should ask the user to choose any of these functions, then call the function with the numbers as arguments, and tell the user the sum.

Problem: 2 | Function Overloading

Modify Problem 1 remove the "sum" functions and add a single "sum" function which can take up to four integer arguments, but also works if the number of arguments are 2 or 3. For example:

sum(10, 15)

sum(10, 15, 25)

sum(10, 15, 25, 30)

Problem: 3 | User-defined function

Write a function equalsIgnoreCase, which receives two char arrays and their sizes, and returns true if the two char arrays contain the same characters irrespective of the case. For example, for character arrays {'a', 'B', 'c'} and {'A', 'b', 'c'}, the function returns true, but for {'a', 'B', 'c'} and {'a', 'B'}, or {'a', 'B', 'c'} and {'X', 'b', 'z'}, the function returns false.

Problem: 4 | User-defined function

Write a function CountDigit which receives two arguments: a char array and the size of the array (of type int). This function counts the number of digit letters in the char array, and returns the count (of type int)

Problem: 5 | User-defined function

Write a function named "location_of_target" that takes as its arguments the following:

- (1) an array of integer values;
- (2) An integer that tells how many integer values are in the array;
- (3) an integer "target value". The function should determine whether the given target value occurs in any of the cells of the array, and if it does, the function should return the subscript of the cell containing the target value. If more than one of the cells contains the

0	1	2	3	4	5	6
58	26	91	34	70	34	88

target value, then the function should return the largest subscript of the cells that contain the target value. If the target value does not occur in any of the cells, then the function should return the sentinel value -1. Thus, for example, if the target value that's passed to the function is 34 and the array that's passed to the function looks like this:
then the target value occurs in cells 3 and 5, so the function should return the integer value 5.

Problem: 6 | User-defined function

Write a C++ program that declares two arrays listA and listB of type int and size 10. Define functions for the following prototypes and description to be used on the arrays you declared.

- `void initializeArray(int x[],int sizeX);`
Function to initialize an int array to 0. The array to be initialized and its size are passed as parameters. The parameter sizeX specifies the number of elements to be initialized.
- `void fillArray(int x[],int sizeX);`
Function to read and store the data into an int array. The array to store the data and its size are passed as parameters. The parameter sizeX specifies the number of elements to be read
- `void printArray(const int x[],int sizeX);`
Function to print the elements of an int array. The array to be printed and the number of elements are passed as parameters. The parameter sizeX specifies the number of elements to be printed
- `int sumArray(const int x[],int sizeX);`
Function to find and return the sum of the elements of an int array. The parameter sizeX specifies the number of elements to be added
- `int indexLargestElement(const int x[],int sizeX);`
Function to find and return the index of the largest element in an int array. The parameter sizeX specifies the number of elements in the array
- `int indexSmallestElement(const int x[],int sizeX);`
Function to find and return the index of the smallest element in an int array. The parameter sizeX specifies the number of elements in the array
- `void copyArray(int list1[], int src, int list2[], int dist, int numOfElements);`
Function to copy some or all of the elements of one array into another array. Starting at the position specified by src, the elements of list1 are copied into list2 starting at the position specified by dist. The parameter numOfElements specifies the number of elements of list1 to be copied into list2. Starting at the position specified by tar, the list2 must have enough components to copy the elements of list1. The following call copies all of the elements of list1 into the corresponding positions in list2:
`copyArray(list1, 0, list2, 0, numOfElements);`

Call each function one-by-one in your main function.

Problem: 7 | User-defined function

A small airline has just purchased a computer for its new automated reservations system. You've been asked to program the new system. You are to write a program to assign seats on each flight of the airline's only plane (capacity: 100 seats – 50 in first class and 50 in economy class).

Your program should display the following menu of alternatives—Please type 1 for "First Class" and Please type 2 for "Economy". If the person types 1, your program should assign a seat in the first-class section (seats 1–50). If the person types 2, your program should assign a seat in the economy section (seats 51–100). Your program should print a boarding pass indicating the person's seat number and whether it's in the first class or economy section of the plane.

Use a two-dimensional array to represent the seating chart of the plane. Initialize all the elements of the array to false to indicate that all seats are empty. As each seat is assigned, set the corresponding elements of the array to true to indicate that the seat is no longer available. Your program should, of course, never assign a seat that has already been assigned. When the first-class section is full, your program should ask the person if it's acceptable to be placed in the economy section (and vice versa). If yes, then make the appropriate seat assignment. If no, then print the message "Next flight leaves in 3 hours."

The seating of the plane is as following.

Each row contains 10 seats. Seats 1 through 50 are first class and 51 through 100 are economy.

The pass should contain proper indentation (use setw(), setfill() etc. from the iomanip library).

If user want to check the seats reserved then show the graph to user.

Problem: 8 | Default parameter User-defined function

Run this program and correct mistake is function calls. Specify that why call function is correct, incorrect, legal or illegal with proper explanation on lines having "?".

```
#include <iostream>
#include <iomanip>
using namespace std;
int volume(int l = 1, int w = 1, int h = 1);
void funcOne(int& x, double y = 12.34, char z = 'B');
int main()
{
    int a = 23;
    double b = 48.78;
    char ch = 'M';
    cout << fixed << showpoint;
    cout << setprecision(2);
    cout << "Line 1: a = " << a << ", b = "
        << b << ", ch = " << ch << endl; //Line 1
    cout << "Line 2: Volume = " << volume()//?
```

```
<< endl; //Line 2
cout << "Line 3: Volume = " << volume(5.4, 4) //?
    << endl; //Line 3
cout << "Line 4: Volume = " << volume('A') //?
    << endl; //Line 4
cout << "Line 5: Volume = "
    << volume(6, 4, 5) << endl; //?
funcOne(a); //?
funcOne(a, 42.68, 1); //?
funcOne(a, 34.65, 'Q'); //?
cout << "Line 9: a = " << a << ", b = "
    << b << ", ch = " << ch << endl; //Line 9
return 0;
}
int volume(int l, int w, int h)
{
    return l * w * h; //Line 10
}
void funcOne(int& x, double y, char z)
{
    x = 2 * x; //Line 11
    cout << "Line 12: x = " << x << ", y = "
        << y << ", z = " << z << endl; //Line 12
}
```

Problem: 9 | User-defined function, bubble sorting

Write a program that takes 20 int values from user in an array and pass array to function bubbleSort() which will sort array elements in ascending order using bubble sort technique. Call function in main.

Best of luck 😊

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