Data Structures and Algorithms

Lab Journal - Lab 1

Name: _____

Enrollment #: _____

Class/Section: _____

Objective

This lab is intended to provide a recap of arrays in C++. In addition, the lab will also serve to provide a review of the some of the features of object oriented programming covered in the previous course. The concepts reviewed during this session will be frequently used in the subsequent lab sessions.

Task 1 :

Give answers to the following.

1.	Write the prototype of a function named fnct() which accepts an array of integers, a pointer to double, a float by reference and returns a character.

2.	Write statements as directed:
	`int a[]={1,2,3,4,5};`
	`int *p;`
	`p = a;`
	`//Print the elements of array using the mentioned notation:`
	`for (int i = 0; i < 5; i++)`
	`{`
	`//Subscript notation with name of array`
	`//Subscript notation with pointer 'p'`

```
        //Offset notation using array name



        //Offset notation using pointer 'p'


}
```

3. What is the difference between function overloading and function overriding?

4. Write C++ statement(s) to allocate space for 10 doubles (using dynamic memory allocation).

5. Study the given program and determine what the program is intended to do. (Hint: Dry run the program with array {1,2,1,2,3} and analyze the output).

```
int size = 5;
int *arr = new int[size];
int i, j, k;

cout<<"Enter array elements: ";
for (i=0;i<size;i++)
    cin>>arr[i];

for (i = 0; i < size; i++) {
   for (j = i + 1; j < size;) {
      if (arr[j] == arr[i]) {
         for (k = j; k < size; k++) {
            arr[k] = arr[k + 1];
         }
         size--;
      } else
         j++;
   }
}


for (i = 0; i < size; i++) {
   cout<< arr[i]<<endl;
}
```

```
delete arr;
```

Task 2 :

Implement the given exercises.

Exercise 1

Write a C++ function which accepts an array of integers and the size of the array and finds :

a. Sum of the elements in the array
b. Average of the array elements
c. Minimum and maximum values in the array

In the main program, declare an array of 10 integers using dynamic memory allocation and call the aforementioned function. Display the output of the function within the main. (Use call by reference for output values).

Exercise 2

Write a program with a function which accepts an array of integers and a key value. The function should return the sum of all the multiples of the key value in the array. For example, for the array {1, 4, 10, 12, 15, 20, 22} and the key value 5, the function should return the sum 10+15+20.

Exercise 3

Create a class Matrix to model 2x2 matrices. Provide a default and parameterized constructor to assign values to the matrix. Using a member function, overload the '+' operator to add two matrices. Likewise, overload the '~' operator to find the determinant of the matrix. Also provide a display() member function to print the matrix. In the main program, create an object of class Matrix and call its member functions.

Exercise 4

Write a program that writes elements of an array (one by one) to a file using an ofstream object and 'write()' function. In the same program, declare another array (of same size) and read the values written in the file using the 'read()' function of an ifstream object. Display the values read from the file.

Implement the given exercises and get them checked by your instructor. If you are unable to complete the tasks in the lab session, deposit this journal alongwith your programs (printed or handwritten) before the start of the next lab session.

S No.	Exercise	Checked By:
1.	Exercise 1	
2.	Exercise 2	
3.	Exercise 3	
4.	Exercise 4	

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