Higher Diploma in Information Technology

Introduction to Programming (C++)

Year 1 Semester 1 – 2023

Worksheet 08

Intended Learning Outcomes:

At the end of the class the students should be able to:

- Learn how to pass arrays as arguments to functions

Exercise 01: Write a C++ program **Ex01.cpp** to do the following.

a) Implement the functions print(), input() and reciprocal().

- The **input()** function should allow the user to enter a size number of values from the keyboard.
- The **print()** function should print the contents of the array in a single line separated by spaces.
- The **reciprocal()** function should calculate the reciprocal of each separate element in the array. **Note: the reciprocal of x is** $\frac{1}{x}$

b) Test your program with suitable data.

```
#include <iostream>
using namespace std;
void print(float data[], int size);
void input(float data[], int size);
void reciprocal(float data[], int size);

int main() {
     float a[] = {10, 20, 30, 40};
     float b[6];
     input(b,6);

     cout << "array A intial values "<<endl;
     print(a,4);
     cout << "array B intial values "<<endl;
     print(b,6);

     reciprocal(b,6);
     reciprocal(a,4);

     cout << "array A after calculation "<<endl;
     print(a,4);
     cout << "array B after calculation "<<endl;
     print(b,6);

     return 0;
}
```

Exercise 02: Write a C++ program called **Ex02.cpp** to implement the `PrintTot()` function which will total up each row in the 2D array and print the total as shown below in the sample output.

Sample output:

Row 0 Total is = 100

Row 1 Total is = 200

Row 2 Total is = 300

```
#include <iostream>
using namespace std;
void PrintTot(int arr[][4], int rows, int col);

int main() {
     int data[3][4] = {{10, 20, 30, 40},
                       {35, 45, 55, 65},
                       {90, 80, 70, 60}};
     PrintTot(…, 3, 4);
     return 0;
}
```

Exercise 03: Implement a C++ program called **Ex03.cpp** to implement the `printAll()` function that prints all the names in the data array.

Note that `data[0] = "kamal";`

```
#include <iostream>
using namespace std;
void printAll(char arr[][20], int size);

int main() {
     char data[4][20] = {"kamal", "wimal", "anjana", "lalitha"};
     printAll(data, 4);
     return 0;
}
```

Exercise 04: Implement the `Multiply()` function which will multiply the 2D array with the given value. Write a C++ program **Ex04.cpp** that reads an integer value and pass as an argument to the parameter `val`. So, the function should multiply each of the values in the data 2D array by `val`.

If the user insert argument 2 is passed to the parameter `val`. After the function is called `data[][]` should be:

= {{20, 40, 60, 80},
{70, 90, 110, 130},
{180, 160, 140, 120}};

```
#include <iostream>
using namespace std;
void Multiply(int arr[][4], int val, int rows, int cols);

int main() {
     int data[3][4] = {{10, 20, 30, 40},
                       {35, 45, 55, 65},
                       {90, 80, 70, 60}};

     int num;
     cout<<"Enter a number: ";
     cin >> num;

     Multiply(…, num, 3, 4);
     return 0;
}
```

Exercise 05: The "Metro" Pvt. Ltd monitors and records rainfall in 2 districts for 7 days and is shown in the following table 1 and 2 respectively. The measurements are taken in millimeters and range between 0 and 1000 per day.

Table 1 – District A Rainfall

Day	1 (MON)	2 (TUE)	3 (WED)	4 (THU)	5 (FRI)	6 (SAT)	7 (SUN)
Array *index*	0	1	2	3	4	5	6
Rainfall	160.5	180	150	110	290	140.5	165

Table 2 – District B Rainfall

Day	1 (MON)	2 (TUE)	3 (WED)	4 (THU)	5 (FRI)	6 (SAT)	7 (SUN)
Array *index*	0	1	2	3	4	5	6
Rainfall	180	100.5	515	170	155	165	195

a) Write a function using C++ statement called **InputRainfall()** which takes a float array and an integer as the size of the array as parameters. The method should ask the user to insert rainfall of each day and fill the array. The values are entered through the keyboard and range between 0 and 1000 per day.

b) Write a function using C++ statements called **MinimumRainfall()** which takes a float array and integer as the size of the array as parameters. The method should find and return the lowest rainfall in the array.

c) Write a function using C++ statements called **MaximumRainfall()** which takes a float array and integer as the size of the array as parameters. The method should find and return the highest rainfall in the array.

d) Write a function using C++ statements called **AverageRainfall()** which takes a float array and integer as the size of the array as parameters. The method should find and return the average rainfall over 7 days.

e) Write a function using C++ statement called **DisplayDay()** to print the day in letters. The function should take an integer as the day number as a parameter and return the day as a string. ***Note: Use Switch Statements***

```
Day (Parameter):1    ➔  Monday
```

f) Write a function using C++ statements called **PrintReport()** which will take two float arrays (array1, array2) and an integer as the size of the array1 as parameters.

The method prints the report as given below. ***Note: Use the functions already defined to print day in letters, minimum rainfall, maximum rainfall and average rainfall.***

Sample Output:

Day	**District A**	**District B**	**Minimum**	**Maximum**
Monday	160.5	180	160.5	180
Tuesday	180	100.5	100.5	180
Wednesday	150	515	150	515
Thursday	110	170	110	170
Friday	290	155	155	290
Saturday	140.5	165	140.5	165
Sunday	165	195	165	195

g) Implement the main method of a C++ program to do the followings.

- Create float arrays with the names district_A and district_B. The arrays are of size 7.
- Insert district_A rainfall details to the district_A array using the function InputRainfall().
- Insert district_B rainfall details to the district_B array using the function InputRainfall().
- Find and print the highest rainfall of District A using the function MaximumRainfall().
- Find and print the highest rainfall of District B using the function MaximumRainfall().
- Find and print the lowest rainfall of District A using the function MinimumRainfall().
- Find and print the lowest rainfall of District B using the function MinimumRainfall().
- Find and print the average rainfall of District A and District B using the function AverageRainfall().
- Print the report using the function PrintReport().

  Save the program with the name of **Ex05.cpp.**