FUNDAMENTALS OF PROGRAMMING LAB MANUAL 8
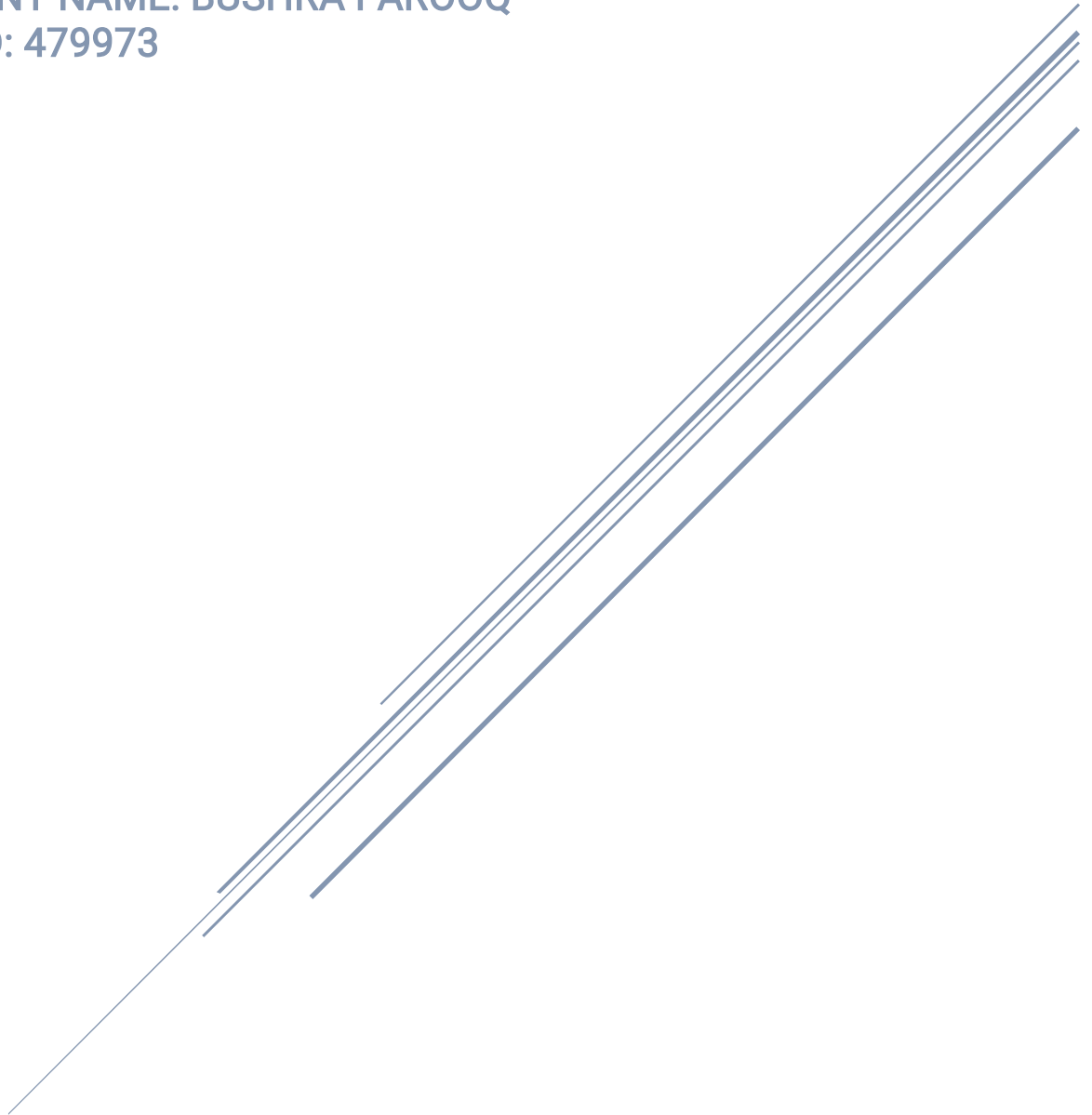
LAB INSTRUCTOR: MUHAMMAD AFFAN

STUDENT NAME: BUSHRA FAROOQ
CMS ID: 479973

LAB TASK

QUESTION # 01

Write a C++ program to calculate average of numbers of array.

```cpp
#include<iostream>
using namespace std;
int main() {
    const int size = 5;
    int numbers[size];

    // Input numbers into the array
    cout << "Enter " << size << " numbers:\n";
    for (int i = 0; i < size; ++i) {
        cout << "Enter number " << i + 1 << ": ";
        cin >> numbers[i];
    }

    // Calculate the sum of numbers
    int sum = 0;
    for (int i = 0; i < size; ++i) {
        sum += numbers[i];
    }

    // Calculate the average
    double average = static_cast<double>(sum) / size;

    // Output the result
```
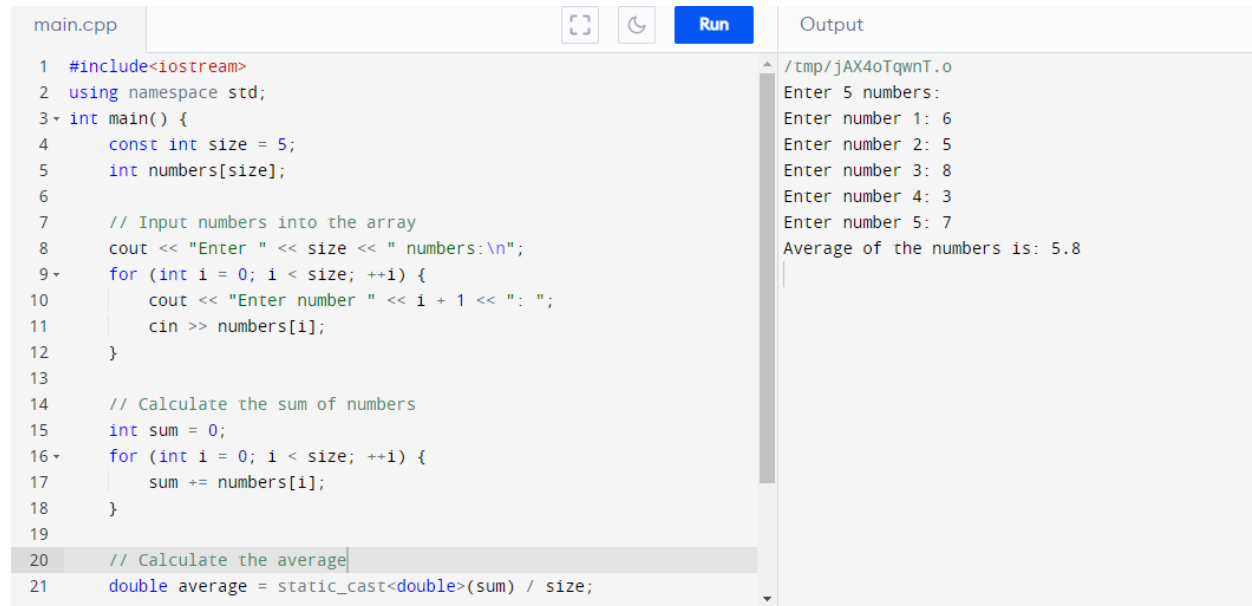
cout << "Average of the numbers is: " << average << endl;

    return 0;

}

```cpp
main.cpp                                    [ ]  (   Run        Output

1   #include<iostream>                              /tmp/jAX4oTqwnT.o
2   using namespace std;                            Enter 5 numbers:
3 - int main() {                                    Enter number 1: 6
4       const int size = 5;                         Enter number 2: 5
5       int numbers[size];                          Enter number 3: 8
6                                                    Enter number 4: 3
7       // Input numbers into the array             Enter number 5: 7
8       cout << "Enter " << size << " numbers:\n";  Average of the numbers is: 5.8
9 -     for (int i = 0; i < size; ++i) {
10          cout << "Enter number " << i + 1 << ": ";
11          cin >> numbers[i];
12      }
13
14      // Calculate the sum of numbers
15      int sum = 0;
16 -    for (int i = 0; i < size; ++i) {
17          sum += numbers[i];
18      }
19
20      // Calculate the average
21      double average = static_cast<double>(sum) / size;
```

QUESTION # 02

Implement Bubble sort on an array of 5 integers.

#include <iostream>

using namespace std;

int main() {

    const int size = 5;

    int numbers[size];

    // Input numbers into the array

    cout << "Enter " << size << " numbers:\n";

    for (int i = 0; i < size; ++i) {

        cout << "Enter number " << i + 1 << ": ";

```cpp
        cin >> numbers[i];
    }


    // Bubble Sort
    for (int i = 0; i < size - 1; ++i) {
        for (int j = 0; j < size - i - 1; ++j) {
            if (numbers[j] > numbers[j + 1]) {
                // Swap elements if they are in the wrong order
                int temp = numbers[j];
                numbers[j] = numbers[j + 1];
                numbers[j + 1] = temp;
            }
        }
    }


    // Output the sorted array
    cout << "Sorted array using Bubble Sort: ";
    for (int i = 0; i < size; ++i) {
        cout << numbers[i] << " ";
    }
    cout << endl;


    return 0;
}
```

```cpp
#include <iostream>
using namespace std;
int main() {
    const int size = 5;
    int numbers[size];

    // Input numbers into the array
    cout << "Enter " << size << " numbers:\n";
    for (int i = 0; i < size; ++i) {
        cout << "Enter number " << i + 1 << ": ";
        cin >> numbers[i];
    }

    // Bubble Sort
    for (int i = 0; i < size - 1; ++i) {
        for (int j = 0; j < size - i - 1; ++j) {
            if (numbers[j] > numbers[j + 1]) {
                // Swap elements if they are in the wrong order
                int temp = numbers[j];
                numbers[j] = numbers[j + 1];
                numbers[j + 1] = temp;
```

```
/tmp/cxR9SsxtYF.o
Enter 5 numbers:
Enter number 1: 2
Enter number 2: 6
Enter number 3: 8
Enter number 4: 5
Enter number 5: 9
Sorted array using Bubble Sort: 2 5 6 8 9
```

QUESTION # 03

Implement Selection Sort on an array of 5 integers.

#include<iostream>

using namespace std;

void swap(int &a, int &b) {

   int temp = a;

  a = b;

  b = temp;

}

void selectionSort(int arr[], int size) {

  for (int i = 0; i < size - 1; ++i) {

    int minIndex = i;

    for (int j = i + 1; j < size; ++j) {

      if (arr[j] < arr[minIndex]) {

        minIndex = j;

      }

```cpp
        }
        if (minIndex != i) {
            swap(arr[i], arr[minIndex]);
        }
    }
}

int main() {
    const int size = 5;
    int numbers[size];

    // Input numbers into the array
    cout << "Enter " << size << " numbers:\n";
    for (int i = 0; i < size; ++i) {
        cout << "Enter number " << i + 1 << ": ";
        cin >> numbers[i];
    }

    // Perform Selection Sort
    selectionSort(numbers, size);

    // Output the sorted array
    cout << "Sorted array using Selection Sort: ";
    for (int i = 0; i < size; ++i) {
        cout << numbers[i] << " ";
    }
    cout << endl;

    return 0;
```

```
}
```

```
1   #include<iostream>
2   using namespace std;
3 ▾ void swap(int &a, int &b) {
4       int temp = a;
5       a = b;
6       b = temp;
7   }
8
9 ▾ void selectionSort(int arr[], int size) {
10▾     for (int i = 0; i < size - 1; ++i) {
11          int minIndex = i;
12▾         for (int j = i + 1; j < size; ++j) {
13▾             if (arr[j] < arr[minIndex]) {
14                  minIndex = j;
15              }
16          }
17▾         if (minIndex != i) {
18              swap(arr[i], arr[minIndex]);
19          }
20      }
21  }
```

```
/tmp/biYQXNqAEt.o
Enter 5 numbers:
Enter number 1: 8
Enter number 2: 6
Enter number 3: 5
Enter number 4: 3
Enter number 5: 9
Sorted array using Selection Sort: 3 5 6 8 9
```