



**Ripah International University**

# **Data Structure (Lab)**

## **Lab Task 3<sup>rd</sup>**

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**1:**

```
#include <iostream>
using namespace std;
```

```
int main()
{
    int array[2][2]={{1, 2},
                     {3, 4}};
    int array1[2][2]={{5, 6},
                     {7, 8}};
    cout<<"Two dimensional array sum are: "<<endl;
    for(int i=0;i<2;i++)
    {
        for(int j=0;j<2;j++)
        {
            cout<<array[i][j]+array1[i][j]<<" ";
        }
        cout<<endl;
    }
    cout<<"Product of arrays are: "<<endl;
    for(int i=0;i<2;i++)
    {
        for(int j=0;j<2;j++)
        {
            cout<<array[i][j]*array1[i][j]<<" ";
        }
        cout<<endl;
    }
    cout<<"Average of arrays are: "<<endl;
    for(int i=0;i<2;i++)
    {
        for(int j=0;j<2;j++)
        {
            cout<<(array[i][j]+array1[i][j])/2<<" ";
        }
        cout<<endl;
    }
    return 0;
}
```

```
E:\Semester 3\sumproductarr.exe
Two dimentional array sum are:
6      8
10     12
Product of arrays are:
5      12
21     32
Average of arrays are:
3      4
5      6
-----
Process exited after 11.59 second
Press any key to continue . . .
```

**2:**

```
#include <iostream>
using namespace std;
```

```
int main()
{
    int a=5;
    int b=8;
    cout<<"Before swap: a= "<<a<<" and b= "<<b<<endl;

    int *ptr1=&a;
    int *ptr2=&b;
    int *ptr3=ptr1;
    ptr1=ptr2;
    ptr2=ptr3;
    cout<<"After swap a= "<<*ptr1<<" and b= "<<*ptr2;

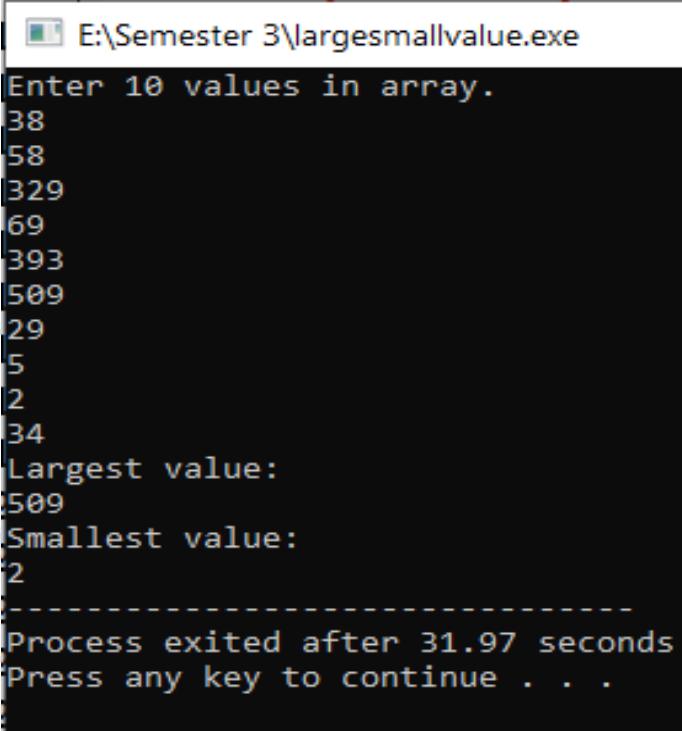
    return 0;
}
```

```
E:\Semester 3\pointerswap.exe
Before swap: a= 5 and b= 8
After swap a= 8 and b= 5
-----
Process exited after 10.6 second
Press any key to continue . . .
```

### 3:

```
#include <iostream>
using namespace std;
```

```
int main()
{
    int largest=0;
    int smallest;
    int arr[10];
    cout<<"Enter 10 values in array."<<endl;
    for(int i=0;i<10;i++)
    {
        cin>>arr[i];
    }
    cout<<"Largest value:"<<endl;
    for(int i=0;i<10;i++)
    {
        if(arr[i]>largest)
        {
            largest=arr[i];
        }
    }
    cout<<largest<<endl;;
    cout<<"Smallest value:"<<endl;
    for(int i=0;i<10;i++)
    {
        if(arr[i]<smallest)
        {
            smallest=arr[i];
        }
    }
    cout<<smallest;
    return 0;
}
```



```
E:\Semester 3\largesmallvalue.exe
Enter 10 values in array.
38
58
329
69
393
509
29
5
2
34
Largest value:
509
Smallest value:
2
-----
Process exited after 31.97 seconds
Press any key to continue . . .
```

## 4:

```
#include <iostream>
using namespace std;

int main()
{
    int a=12, lMonth, hMonth;
    double highest=0;
    double lowest=999999;
    double totalrain;
    double arr[a];
    for (int i=0;i<a;i++)
    {
        cout<<"Enter rainfall of month "<<i+1<<endl;
        cin>>arr[i];
        totalrain+=arr[i];
        if(arr[i]<lowest)
        {
            lowest=arr[i];
            lMonth=i+1;
        }
        if(arr[i]>highest)
        {
            highest=arr[i];
            hMonth=i+1;
        }
    }
    cout<<"\nThe total rainfall for the year are: "<<totalrain<<endl;
    double average=totalrain/12;
    cout<<"\nThe average rainfall are: "<<average<<endl;

    cout<<"\nThe highest rainfall of month "<<hMonth<<" is: "<<highest<<endl;
    cout<<"\nThe lowest rainfall of month "<<lMonth<<" is: "<<lowest<<endl;

    return 0;
}
```

```
E:\Semester 3\rainfallarray.exe
Enter rainfall of month 1
35
Enter rainfall of month 2
40
Enter rainfall of month 3
20
Enter rainfall of month 4
25
Enter rainfall of month 5
30
Enter rainfall of month 6
70
Enter rainfall of month 7
50
Enter rainfall of month 8
60
Enter rainfall of month 9
3
Enter rainfall of month 10
40
Enter rainfall of month 11
20
Enter rainfall of month 12
10

The total rainfall for the year are: 403
The average rainfall are: 33.5833
The highest rainfall of month 6 is: 70
The lowest rainfall of month 9 is: 3

-----
Process exited after 42.84 seconds with r
Press any key to continue . . . _
```

## 5:

```
#include <iostream>
using namespace std;
```

```
const int ROWS = 3;
const int COLS = 4;
```

```
int getTotal(int array[ROWS][COLS]) {
    int total = 0;
    for (int i = 0; i < ROWS; i++) {
        for (int j = 0; j < COLS; j++) {
            total += array[i][j];
        }
    }
}
```

```

    }
}
return total;
}
double getAverage(int array[ROWS][COLS]) {
    int total = getTotal(array);
    int numElements = ROWS * COLS;
    return static_cast<double>(total) / numElements;
}
int getRowTotal(int array[ROWS][COLS], int row) {
    int rowTotal = 0;
    for (int j = 0; j < COLS; j++) {
        rowTotal += array[row][j];
    }
    return rowTotal;
}
int getColumnTotal(int array[ROWS][COLS], int col) {
    int colTotal = 0;
    for (int i = 0; i < ROWS; i++) {
        colTotal += array[i][col];
    }
    return colTotal;
}
int getHighestInRow(int array[ROWS][COLS], int row) {
    int highest = array[row][0];
    for (int j = 1; j < COLS; j++) {
        if (array[row][j] > highest) {
            highest = array[row][j];
        }
    }
    return highest;
}
int getHighestInColumn(int array[ROWS][COLS], int col) {
    int highest = array[0][col];
    for (int i = 1; i < ROWS; i++) {
        if (array[i][col] > highest) {
            highest = array[i][col];
        }
    }
    return highest;
}

int main() {
    int array[ROWS][COLS] = {
        {3, 5, 7, 9},
        {2, 4, 6, 8},
    };
}

```

```
{1, 3, 5, 7}
};

cout << "Total of all elements: " << getTotal(array) << endl;
cout << "Average of all elements: " << getAverage(array) << endl;

int row = 1;
cout << "Total of row " << row << ": " << getRowTotal(array, row) << endl;

int col = 2;
cout << "Total of column " << col << ": " << getColumnTotal(array, col) << endl;

cout << "Highest in row " << row << ": " << getHighestInRow(array, row) << endl;
cout << "Highest in column " << col << ": " << getHighestInColumn(array, col) << endl;

return 0;
}
```



E:\Semester 3\array1.exe

```
Total of all elements: 60
Average of all elements: 5
Total of row 1: 20
Total of column 2: 18
Highest in row 1: 8
Highest in column 2: 7
```

```
-----
Process exited after 10.72 seconds
Press any key to continue . .
```



## 6:

```
#include <iostream>
using namespace std;

int main() {
    int size;
    cout << "Enter the number of integers: ";
    cin >> size;
    int* array = new int[size];
    cout << "Enter " << size << " integers:" << endl;
    for (int i = 0; i < size; i++) {
        cin >> array[i];
    }
    int sumOfOdd = 0;
    for (int i = 0; i < size; i++) {
        if (array[i] % 2 != 0) {
            sumOfOdd += array[i];
        }
    }
    cout << "Sum of odd integers: " << sumOfOdd << endl;
    delete[] array;

    return 0;
}
```



Select E:\Semester 3\sumofOdd.exe

Enter the number of integers: 5

Enter 5 integers:

3

6

9

2

8

Sum of odd integers: 12

-----  
Process exited after 41.13 seconds

Press any key to continue . . .

## 7:

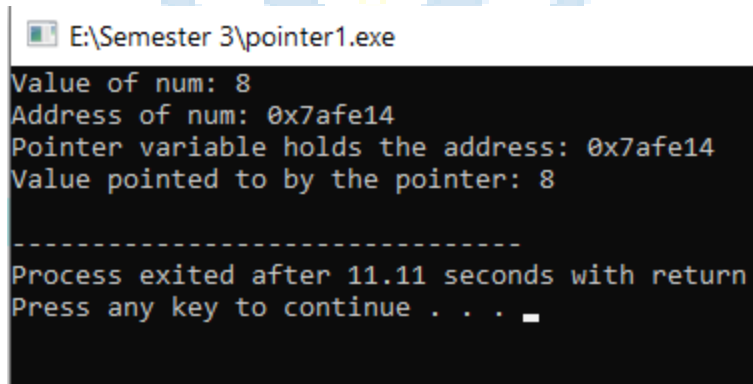
```
#include <iostream>
using namespace std;

int main() {
    int num = 8;

    int* ptr = &num;

    cout << "Value of num: " << num << endl;
    cout << "Address of num: " << &num << endl;
    cout << "Pointer variable holds the address: " << ptr << endl;
    cout << "Value pointed to by the pointer: " << *ptr << endl;

    return 0;
}
```



```
E:\Semester 3\pointer1.exe
Value of num: 8
Address of num: 0x7afe14
Pointer variable holds the address: 0x7afe14
Value pointed to by the pointer: 8

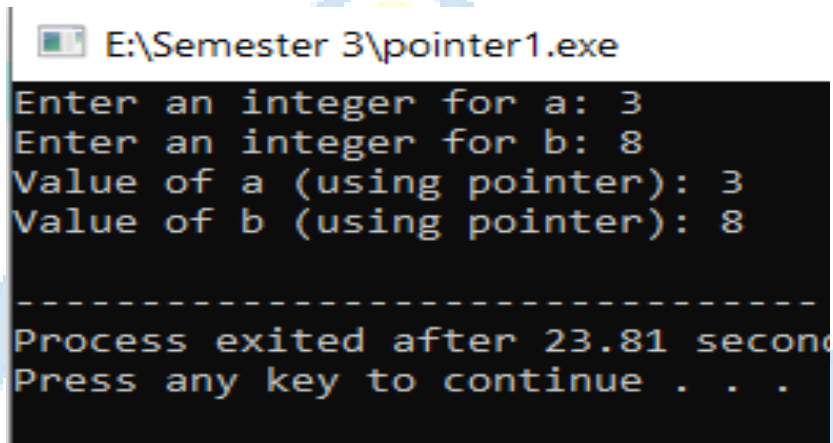
-----
Process exited after 11.11 seconds with return
Press any key to continue . . .
```

## 8:

```
#include <iostream>
using namespace std;

int main() {
    int a, b;
    cout << "Enter an integer for a: ";
    cin >> a;
    cout << "Enter an integer for b: ";
    cin >> b;
    int* ptrA = &a;
    int* ptrB = &b;
    cout << "Value of a (using pointer): " << *ptrA << endl;
    cout << "Value of b (using pointer): " << *ptrB << endl;
}
```

```
return 0;
}
```



```
E:\Semester 3\pointer1.exe
Enter an integer for a: 3
Enter an integer for b: 8
Value of a (using pointer): 3
Value of b (using pointer): 8

-----
Process exited after 23.81 seconds
Press any key to continue . . .
```

## 9:

```
#include <iostream>
#include <cmath>
using namespace std;
```

```
void Menu();
int Addition(int a, int b);
int Subtraction(int a, int b);
int Multiplication(int a, int b);
double Division(int a, int b);
int Pow(int number, int pow);
```

```
int main() {
    Menu();

    return 0;
}
```

```
void Menu() {
    int choice, a, b;

    do {
        cout << "Calculator Menu:" << endl;
        cout << "1. Addition" << endl;
        cout << "2. Subtraction" << endl;
        cout << "3. Multiplication" << endl;
        cout << "4. Division" << endl;
        cout << "5. Power" << endl;
```

```

cout << "6. Exit" << endl;
cout << "Enter your choice (1-6): ";
cin >> choice;

if (choice >= 1 && choice <= 4) {
    cout << "Enter two integers: ";
    cin >> a >> b;
} else if (choice == 5) {
    cout << "Enter a base number and exponent: ";
    cin >> a >> b;
}

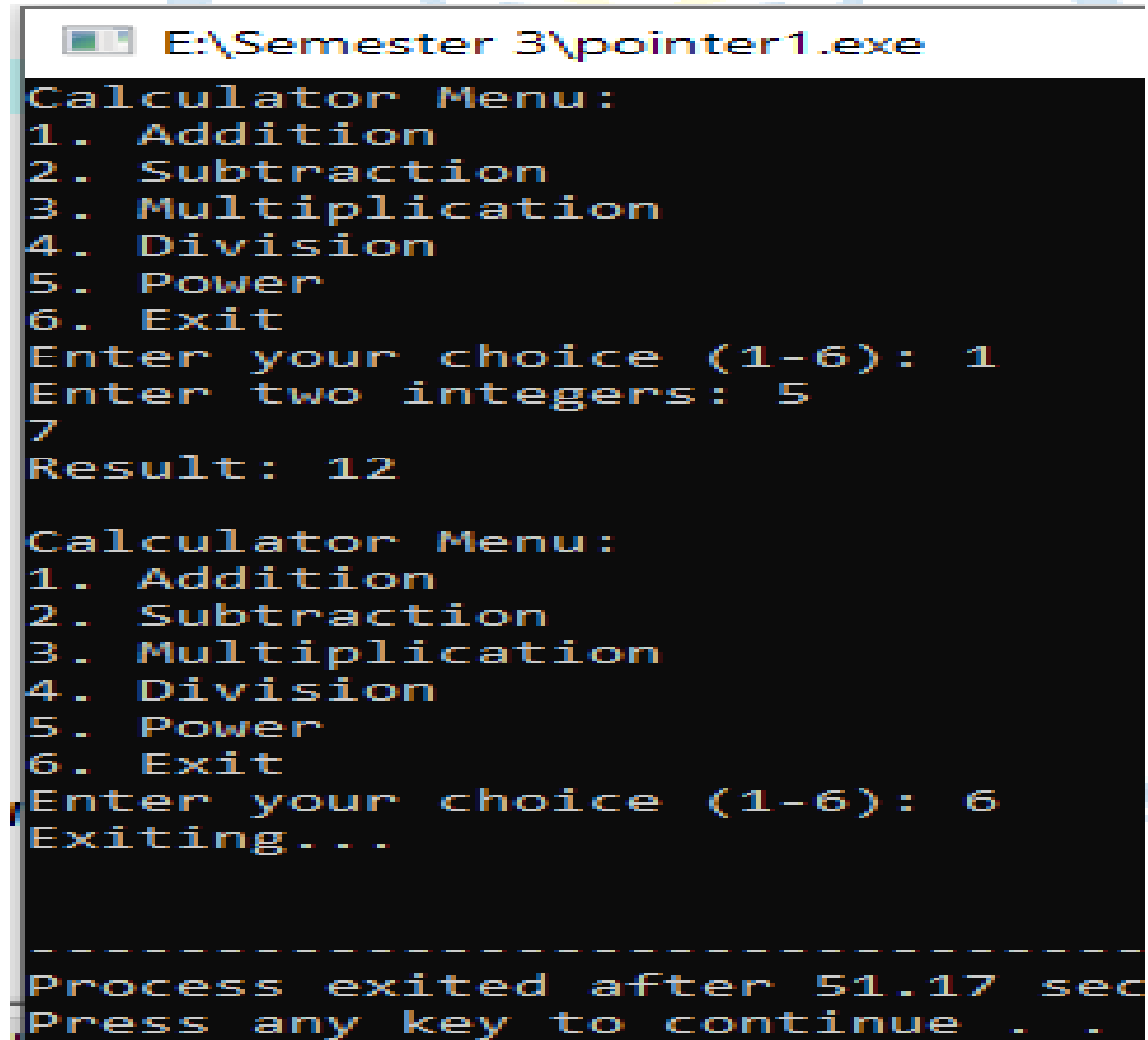
switch (choice) {
    case 1:
        cout << "Result: " << Addition(a, b) << endl;
        break;
    case 2:
        cout << "Result: " << Subtraction(a, b) << endl;
        break;
    case 3:
        cout << "Result: " << Multiplication(a, b) << endl;
        break;
    case 4:
        if (b != 0) {
            cout << "Result: " << Division(a, b) << endl;
        } else {
            cout << "Error: Division by zero is not allowed!" << endl;
        }
        break;
    case 5:
        cout << "Result: " << Pow(a, b) << endl;
        break;
    case 6:
        cout << "Exiting..." << endl;
        break;
    default:
        cout << "Invalid choice! Please try again." << endl;
}

cout << endl;
} while (choice != 6);
}

int Addition(int a, int b) {
    return a + b;
}

```

```
int Subtraction(int a, int b) {  
    return a - b;  
}  
  
int Multiplication(int a, int b) {  
    return a * b;  
}  
  
double Division(int a, int b) {  
    return static_cast<double>(a) / b;  
}  
  
int Pow(int number, int pow) {  
    return static_cast<int>(std::pow(number, pow));  
}
```



```
E:\Semester 3\pointer1.exe  
Calculator Menu:  
1. Addition  
2. Subtraction  
3. Multiplication  
4. Division  
5. Power  
6. Exit  
Enter your choice (1-6): 1  
Enter two integers: 5  
7  
Result: 12  
  
Calculator Menu:  
1. Addition  
2. Subtraction  
3. Multiplication  
4. Division  
5. Power  
6. Exit  
Enter your choice (1-6): 6  
Exiting...  
  
-----  
Process exited after 51.17 sec  
Press any key to continue . .
```