



COMSATS University Islamabad, Vehari Campus

Department of Computer Science

Class: BCS-SP22-4A

Submission Deadline: 10 Sep 2023

Subject: Data Structures and Algorithms-Lab

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Max Marks: 10

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You can ask queries related to Lab Activities on the above email.

Activity 1:

Create a GitHub Account. Make a repository with the name “**DSA_Lab**”. Mention the link here after the account creation.

https://github.com/MufeezAslam/DSA_Lab.git

Activity 2:

Write any 15 programs that will explain the concepts of pointers.

In this file, you should place the code and its output screenshot.

After completing the activities, Upload the final pdf and code to the “**DSA_Lab**” repository.

PROGRAM #01

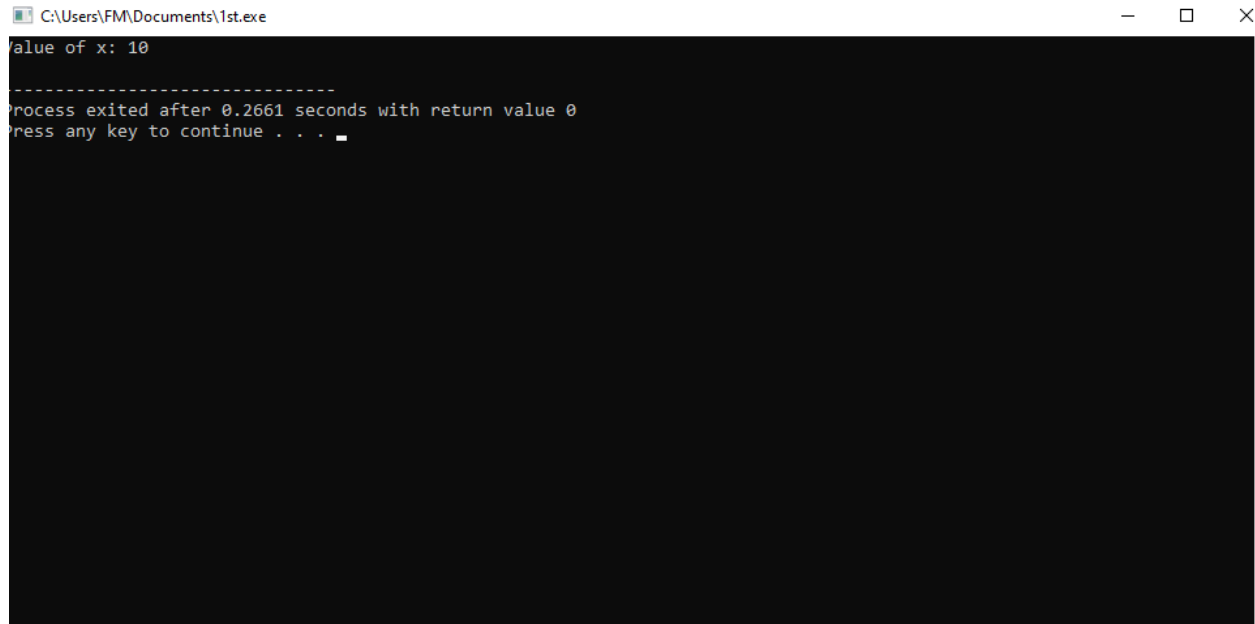
Pointer Declaration and Initialization:

```
#include <iostream>
using namespace std;
int main() {
```

```

int x = 10;
int *ptr = &x;
cout << "Value of x: " << *ptr << endl;
return 0;
}

```



```

C:\Users\FM\Documents\1st.exe
Value of x: 10
-----
Process exited after 0.2661 seconds with return value 0
Press any key to continue . . .

```

PROGRAM 02:

Assign the address

```

#include <iostream>

Using namespace std;

int main() {
    int x = 10;
    cout << "Value of x: " << x << endl;
    cout << "Address of x: " << &x << endl;

    return 0;
}

```

```
C:\Users\FM\Documents\10.exe
Value of x: 10
Address of x: 0x6ffe0c

-----
Process exited after 0.2504 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 03:

Pointer Arithmetic:

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

int main() {
    int arr[] = {1, 2, 3, 4, 5};
    int *ptr = arr;
    cout << "Value at ptr: " << *ptr << endl;
    ptr++;
    cout << "Value at ptr after increment: " << *ptr << endl;
    return 0;
}
```

```
C:\Users\FM\Documents\2nd.exe
/ value at ptr: 1
/ value at ptr after increment: 2
-----
Process exited after 0.2997 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 04:

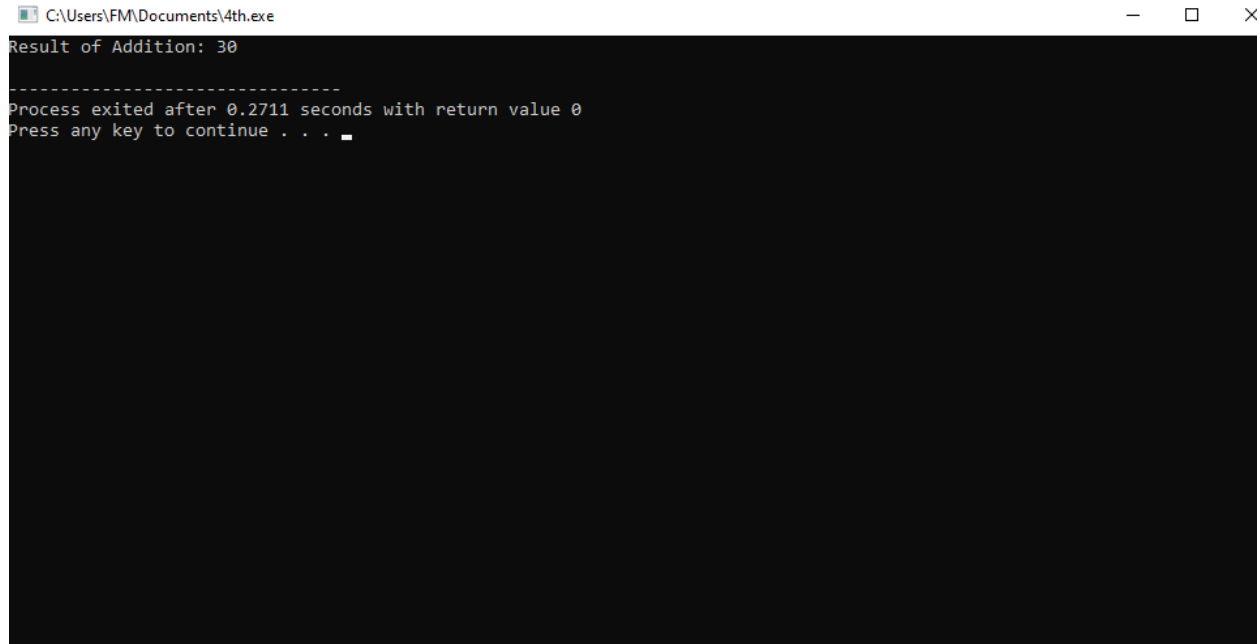
Addition Program

```
#include <iostream>
using namespace std;
int main() {
    int num1 = 20;
    int num2 = 10;

    int *ptr1 = &num1;
    int *ptr2 = &num2;

    int result = *ptr1 + *ptr2;

    cout << "Result of Addition: " << result << endl;
    return 0;
}
```



```
C:\Users\FM\Documents\4th.exe
Result of Addition: 30
-----
Process exited after 0.2711 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 05:

Subtraction Program:

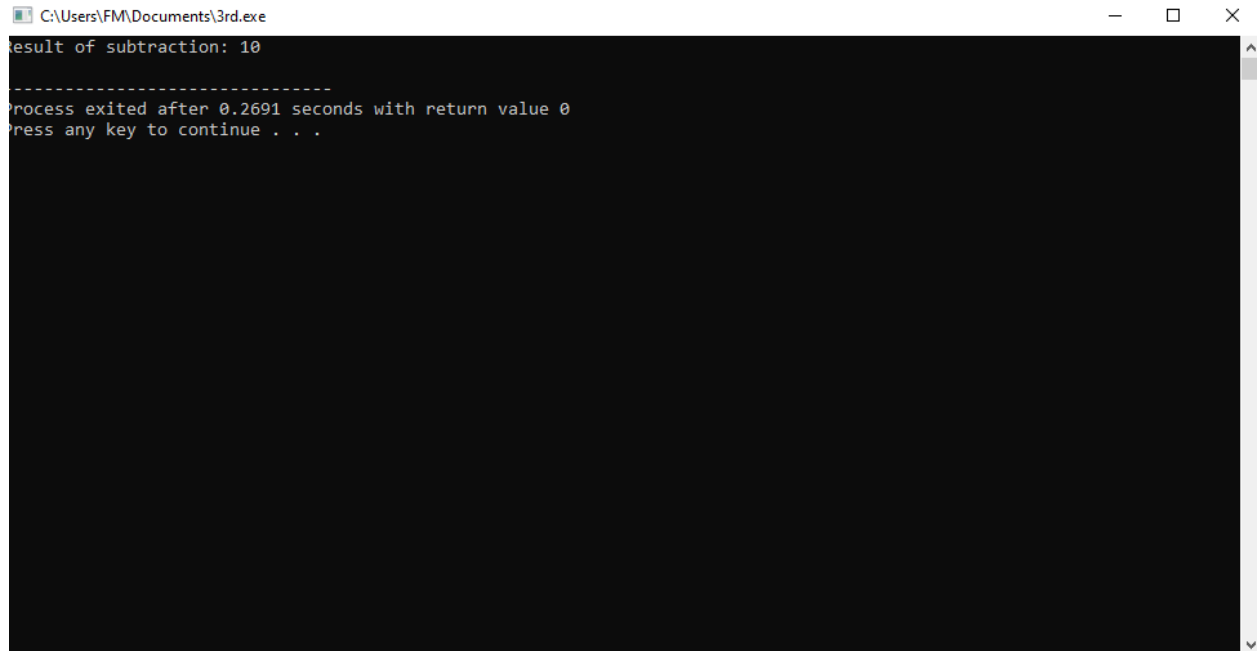
```
#include <iostream>
using namespace std;
int main() {
    int num1 = 20;
    int num2 = 10;

    int *ptr1 = &num1;
    int *ptr2 = &num2;

    int result = *ptr1 - *ptr2;

    cout << "Result of subtraction: " << result << endl;
```

```
    return 0;
}
```



```
C:\Users\FM\Documents\3rd.exe
result of subtraction: 10
-----
Process exited after 0.2691 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 06:

Multiplication Program

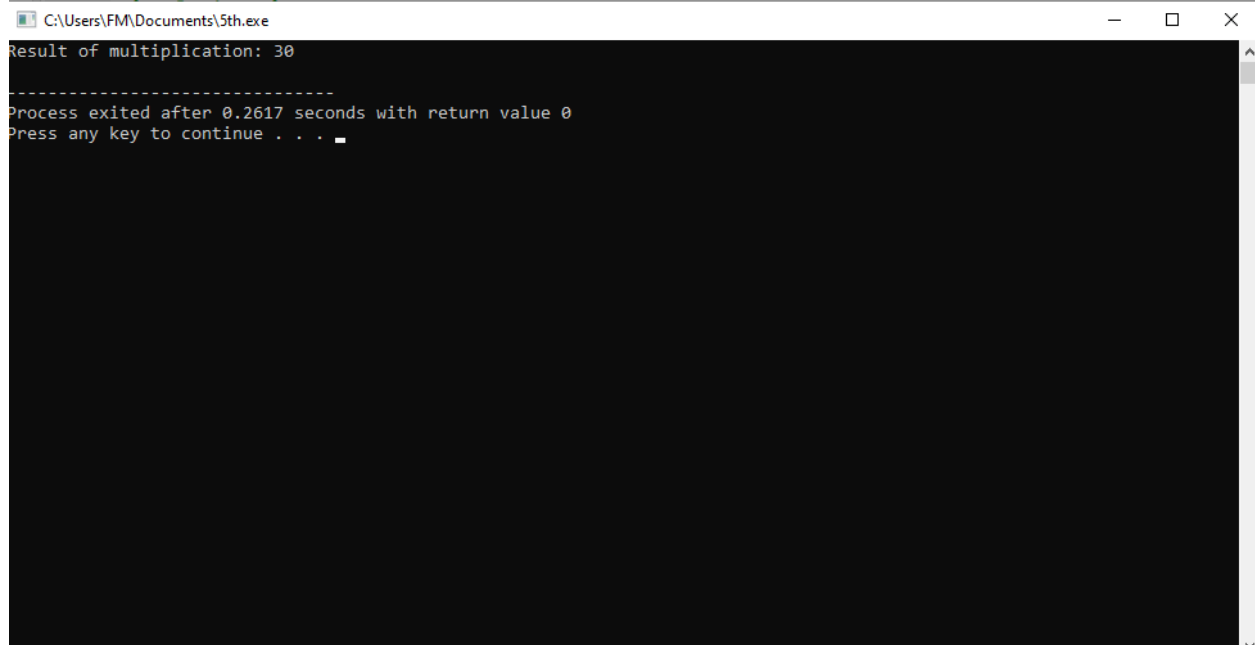
```
#include <iostream>
using namespace std;
int main() {
    int num1 = 5;
    int num2 = 6;

    int *ptr1 = &num1;
    int *ptr2 = &num2;

    int result = (*ptr1) * (*ptr2);

    cout << "Result of multiplication: " << result << endl;
```

```
return 0;
}
```



```
C:\Users\FM\Documents\5th.exe
Result of multiplication: 30
-----
Process exited after 0.2617 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 07;

Division program

```
#include <iostream>
using namespace std;
int main() {
    double num1 = 20.0;
    double num2 = 5.0;

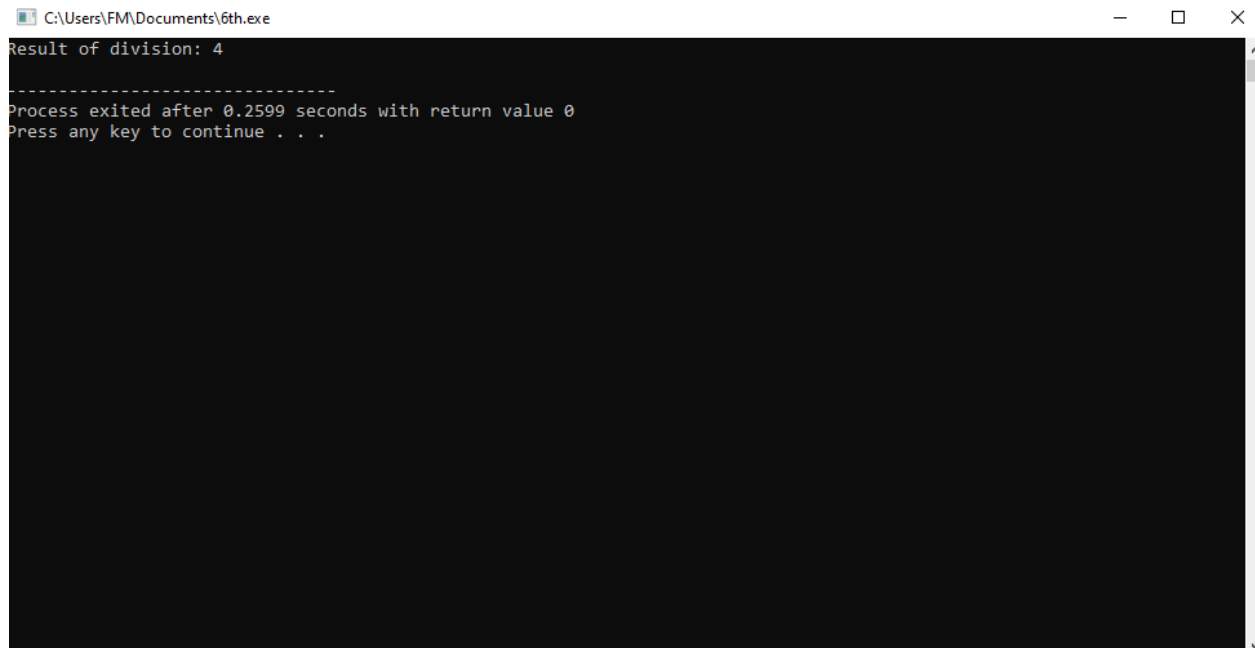
    double *ptr1 = &num1;
    double *ptr2 = &num2;

    double result = (*ptr1) / (*ptr2);

    cout << "Result of division: " << result << endl;

    return 0;
```

```
}
```



```
C:\Users\FM\Documents\6th.exe
Result of division: 4
-----
Process exited after 0.2599 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 08;

Decrement program

```
#include <iostream>
using namespace std;
int main() {
    int num = 10;

    int *ptr = &num;

    (*ptr)--;
    cout << "Result after decrement: " << *ptr << endl;

    return 0;
}
```

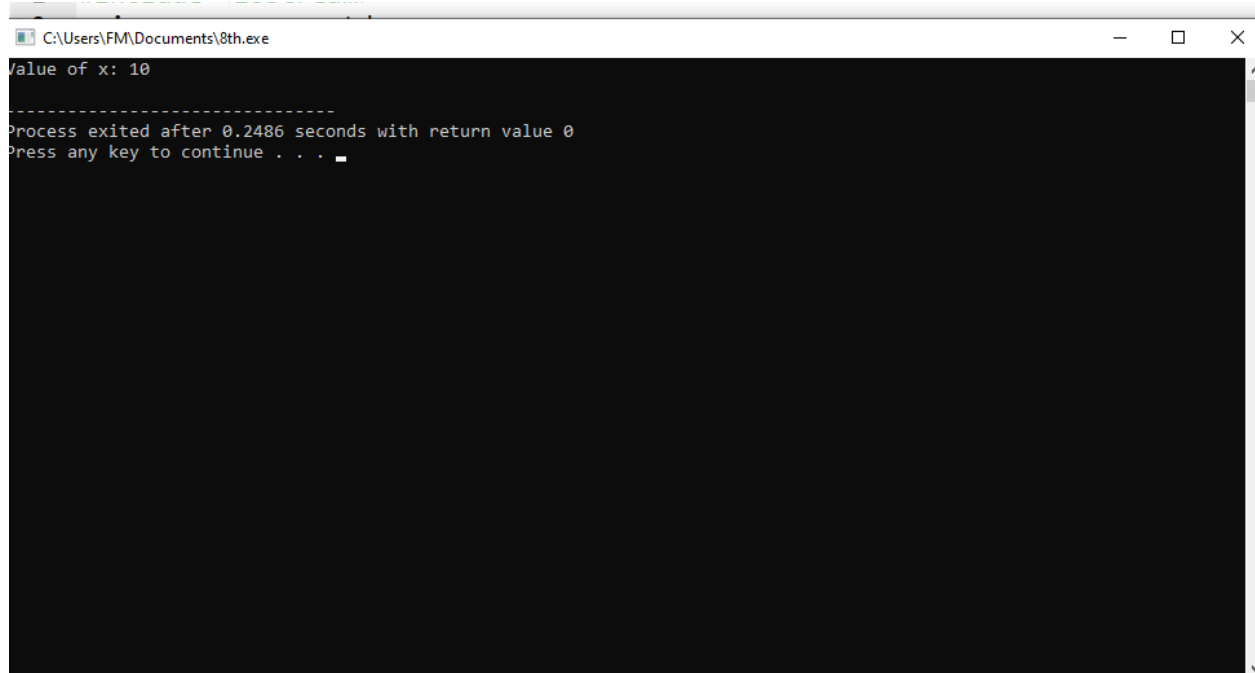


```
C:\Users\FM\Documents\7th.exe
result after decrement: 9
-----
Process exited after 0.2486 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 09;

Pointer to pointer program

```
#include <iostream>
using namespace std;
int main() {
    int x = 10;
    int *ptr1 = &x;
    int **ptr2 = &ptr1;
    cout << "Value of x: " << **ptr2 << endl;
    return 0;
}
```



```
C:\Users\FM\Documents\8th.exe
Value of x: 10
-----
Process exited after 0.2486 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 10:

Index pointer program

```
#include <iostream>
using namespace std;
int main() {
    int arr[] = {1, 2, 3, 4, 5};
    int* ptr = arr;

    for (int i = 0; i < 5; i++) {
        cout << "Value at index " << i << ": " << *ptr << endl;
        ptr++;
    }

    return 0;
}
```

```
C:\Users\FM\Documents\9th.exe
Value at index 0: 1
Value at index 1: 2
Value at index 2: 3
Value at index 3: 4
Value at index 4: 5
-----
Process exited after 0.2548 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 11:

Pointer program using function

```
#include <iostream>
using namespace std;
int addNumbers(int* a, int* b) {
    return *a + *b;
}

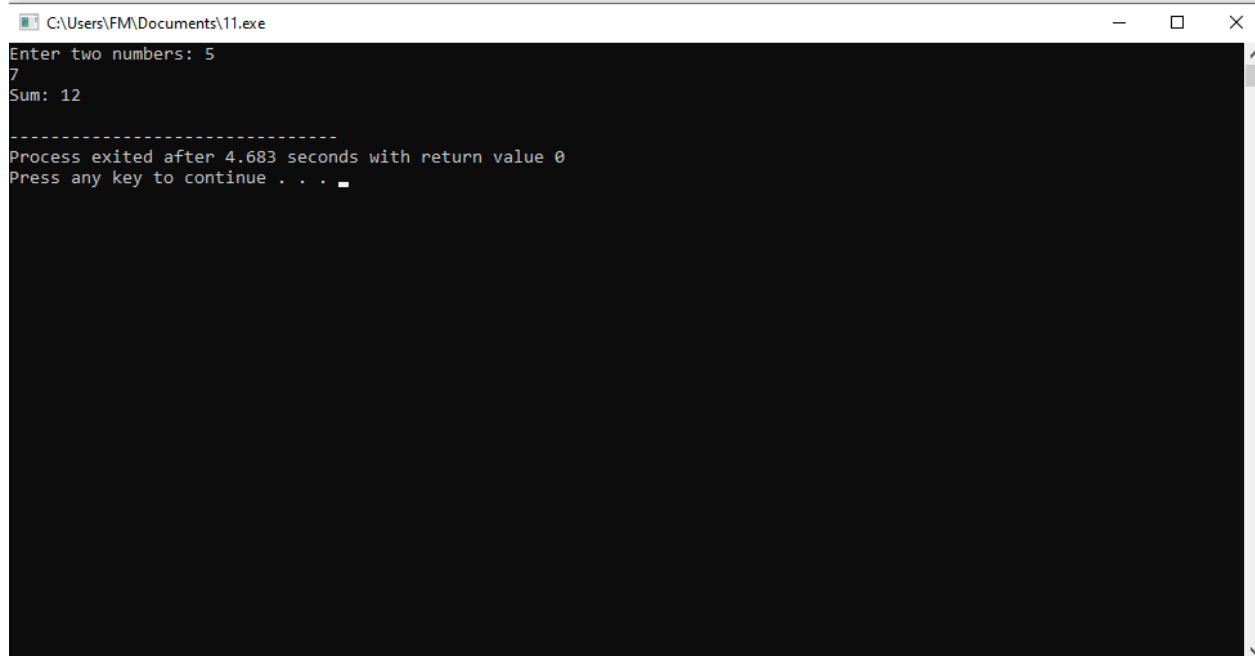
int main() {
    int num1, num2;

    cout << "Enter two numbers: ";
    cin >> num1 >> num2;

    int sum = addNumbers(&num1, &num2);

    cout << "Sum: " << sum << endl;
```

```
    return 0;
}
```



```
C:\Users\FM\Documents\11.exe
Enter two numbers: 5
7
Sum: 12

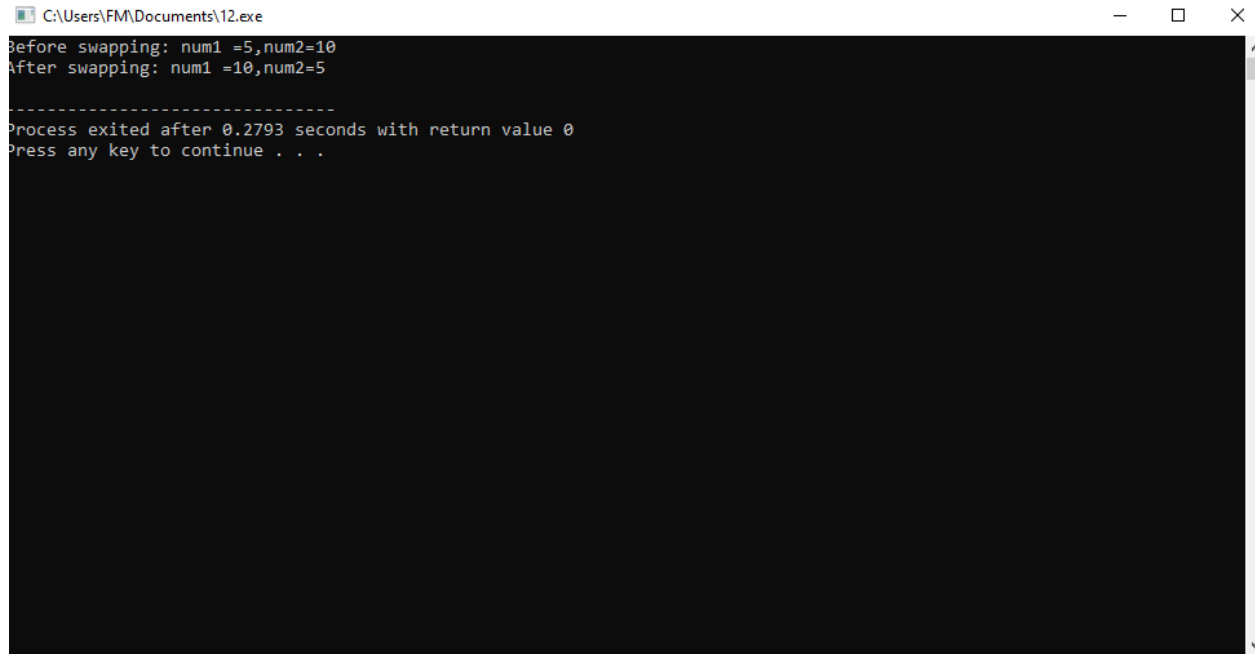
-----
Process exited after 4.683 seconds with return value 0
Press any key to continue . . .
```

Program 12:

Swapping two numbers

```
#include <iostream>
using namespace std;
void swap(int* a, int* b) {
    *a ^= *b;
    *b ^= *a;
    *a ^= *b;
}
int main() {
    int num1 = 5;
    int num2 = 10;
    cout << "Before swapping: num1 ="<<num1<<","num2="<<num2<<endl;
    swap(&num1, &num2);
    cout << "After swapping: num1 ="<<num1<<","num2="<<num2<<endl;
```

```
    return 0;
}
```



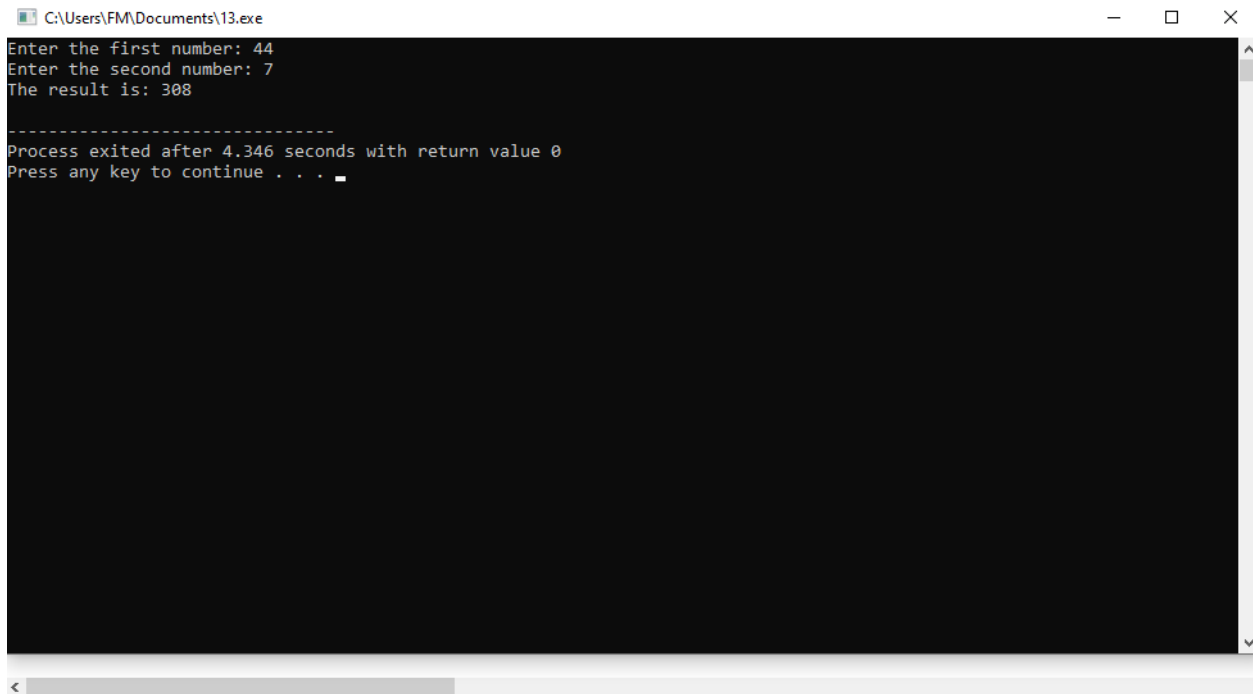
```
C:\Users\FM\Documents\12.exe
Before swapping: num1 =5,num2=10
After swapping: num1 =10,num2=5
-----
Process exited after 0.2793 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 13:

Taking input from user:

```
#include <iostream>
using namespace std;
void multiply(int* a, int* b, int* result) {
    *result = (*a) * (*b);
}
int main() {
    int num1, num2, result;
    cout << "Enter the first number: ";
    cin >> num1;
    cout << "Enter the second number: ";
    cin >> num2;
    multiply(&num1, &num2, &result);
    cout<<"The result is: " << result << endl;
    return 0;
```

```
}
```



```
C:\Users\FM\Documents\13.exe
Enter the first number: 44
Enter the second number: 7
The result is: 308

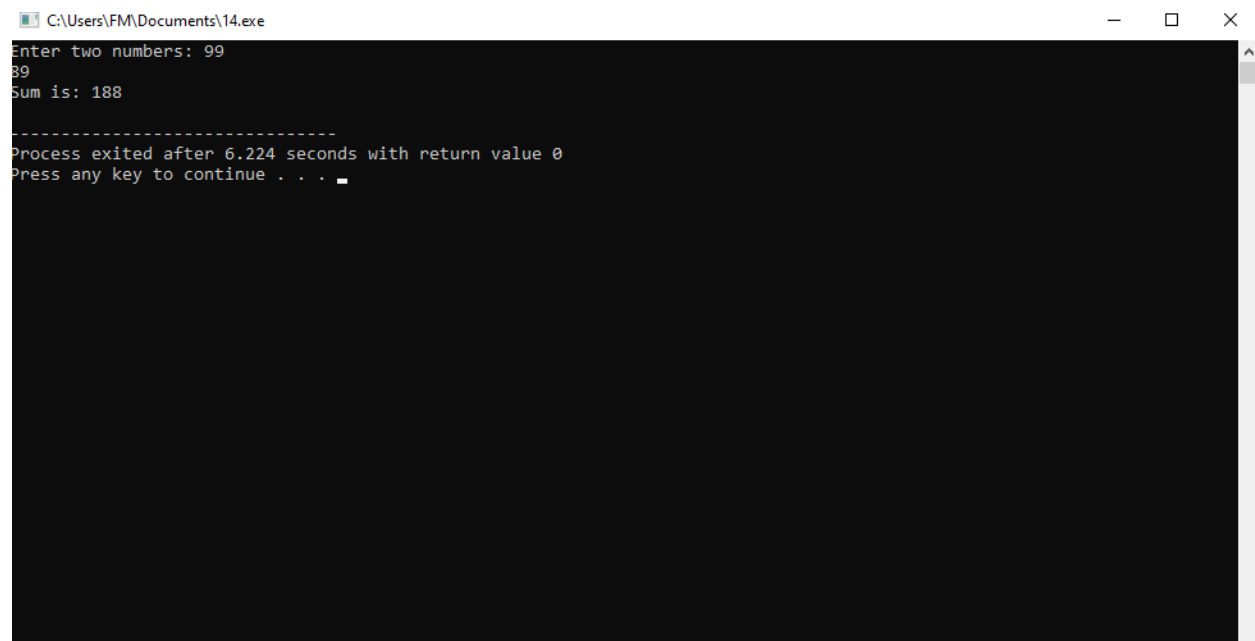
-----
Process exited after 4.346 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 14:

Add two value by taking input from user

```
#include <iostream>
using namespace std;
void add(int* a, int* b, int* result) {
    *result = *a + *b;
}
int main() {
    int num1;
    int num2 ;
    int sum;
    cout << "Enter two numbers: ";
    cin >> num1 >> num2;
    add(&num1, &num2, &sum);
```

```
    cout << "Sum is: " << sum << endl;
    return 0;
}
```



```
C:\Users\FM\Documents\14.exe
Enter two numbers: 99
89
Sum is: 188

-----
Process exited after 6.224 seconds with return value 0
Press any key to continue . . .
```

PROGRAM 15:

Declaring, initializing, and manipulating integer variables using pointers:

```
#include <iostream>
using namespace std;
int main() {

    int number = 42;
    int* pointer = &number;
    cout << "Value of number: " << *pointer << endl;
    *pointer = 99;
    cout << "Updated value of number: " << *pointer << endl;
    return 0;
}
```

C:\Users\FM\Documents\15.exe



Value of number: 42

Updated value of number: 99

Process exited after 0.2268 seconds with return value 0

Press any key to continue . . .