1. Write a C++ program to create a class called MATRIX using a two-dimensional array of integers. Implement the following operations by overloading the operator = = which checks the compatibility of two matrices m1 and m2 to be added and subtracted. Perform the addition and subtraction by overloading the operators + and – respectively. Display the results (sum matrix m3 and difference matrix m4).

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


class matrix
{
        private:
                int m,n;
                int **a;
        public:
                matrix();
                matrix(int m_, int n_);//constructor for nameless temporyary object, here both the arguments should be passed or else the normal constructor will be called and asked to input values m, n from user, that's y i didn't put default arguments here*********
                ~matrix();
                void read();
                bool operator==(const matrix&);
                matrix operator+(const matrix&);
                matrix operator-(const matrix&);
                void display();
};
```

```
matrix::matrix()
{
        cout << "Enter the order of a matrix m x n : " ;
        cin >> m >> n;
        a = (int**)calloc(m, sizeof(int*));
        for(int i = 0; i < m; ++i)
                a[i] = (int*)calloc(n, sizeof(int));
}

matrix::matrix(int m_, int n_) : m(m_), n(n_)
{
        a = (int**)calloc(m, sizeof(int*));
        for(int i = 0; i < m; ++i)
                a[i] = (int*)calloc(n, sizeof(int));
}

matrix::~matrix()
{
        for(int i = 0; i < m; ++i)
                free(a[i]);
        free(a);
}

void matrix::read()
{
        cout<<"Enter the elements of a matrix of order "<<m<<" x "<<n<<" :
"<<endl;
```

```
    for(int i = 0; i < m; ++i)
        for(int j = 0 ; j < n; ++j)
            cin >> a[i][j];
}

bool matrix::operator==(const matrix &m2)
{
    if(m!=m2.m || n!=m2.n)
    {
        cout << "Order of matrix 1 is not equal to order of matrix 2 "
<<endl;
        exit(0);
    }
    for(int i = 0; i < m; ++i)
        for(int j = 0 ; j < n; ++j)
            if(a[i][j]!=m2.a[i][j])
                return false;
    return true;
}

matrix matrix::operator+(const matrix &m2)
{
    matrix m3(m,n);
    for(int i = 0; i < m; ++i)
        for(int j = 0 ; j < n; ++j)
            m3.a[i][j] = a[i][j] + m2.a[i][j];
    return m3;
```

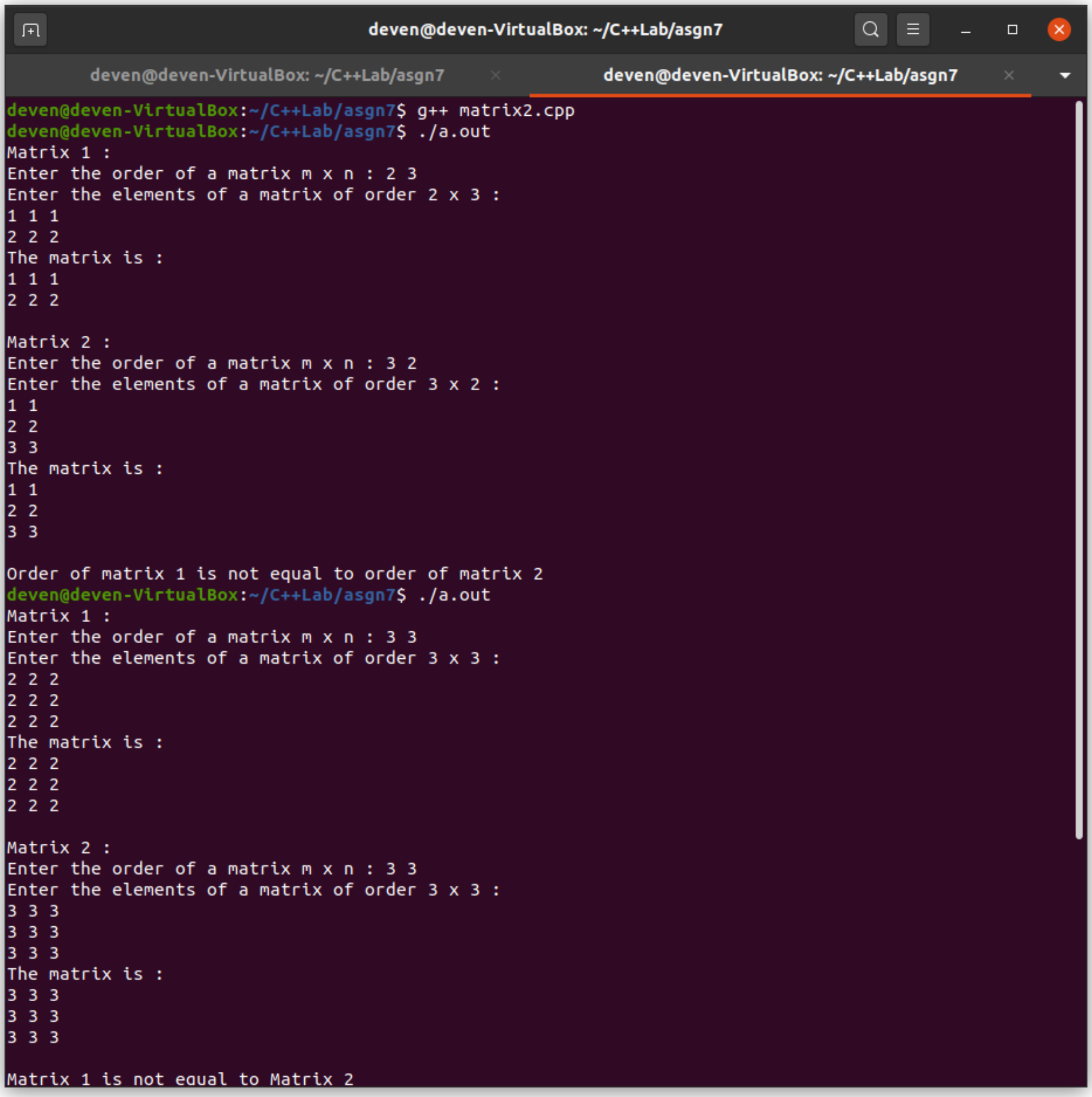
```
}

matrix matrix::operator-(const matrix &m2)
{
	matrix m3(m,n);
	for(int i = 0; i < m; ++i)
		for(int j = 0 ; j < n; ++j)
			m3.a[i][j] = a[i][j] - m2.a[i][j];
	return m3;
}

void matrix::display()
{
	cout << "The matrix is : " << endl;
	for(int i = 0; i < m; ++i)
	{
		for(int j = 0 ; j < n; ++j)
			cout << a[i][j] << " ";
		cout << endl;
	}
	cout << endl;
}

int main()
{
	cout << "Matrix 1 : " << endl;
```

```
    matrix m1;
    m1.read();
    m1.display();
    cout << "Matrix 2 : " << endl;
    matrix m2;
    m2.read();
    m2.display();
    if(m1==m2)
        cout << "Matrix 1 is equal to Matrix 2" << endl << endl;
    else
        cout << "Matrix 1 is not equal to Matrix 2" << endl << endl;
    matrix m3 = m1 + m2;
    cout << "Matrix 1 + Matrix 2 = " << endl;
    m3.display();
    matrix m4 = m1 - m2;
    cout << "Matrix 1 - Matrix 2 = " << endl;
    m4.display();
    return 0;
}
```



deven@deven-VirtualBox: ~/C++Lab/asgn7
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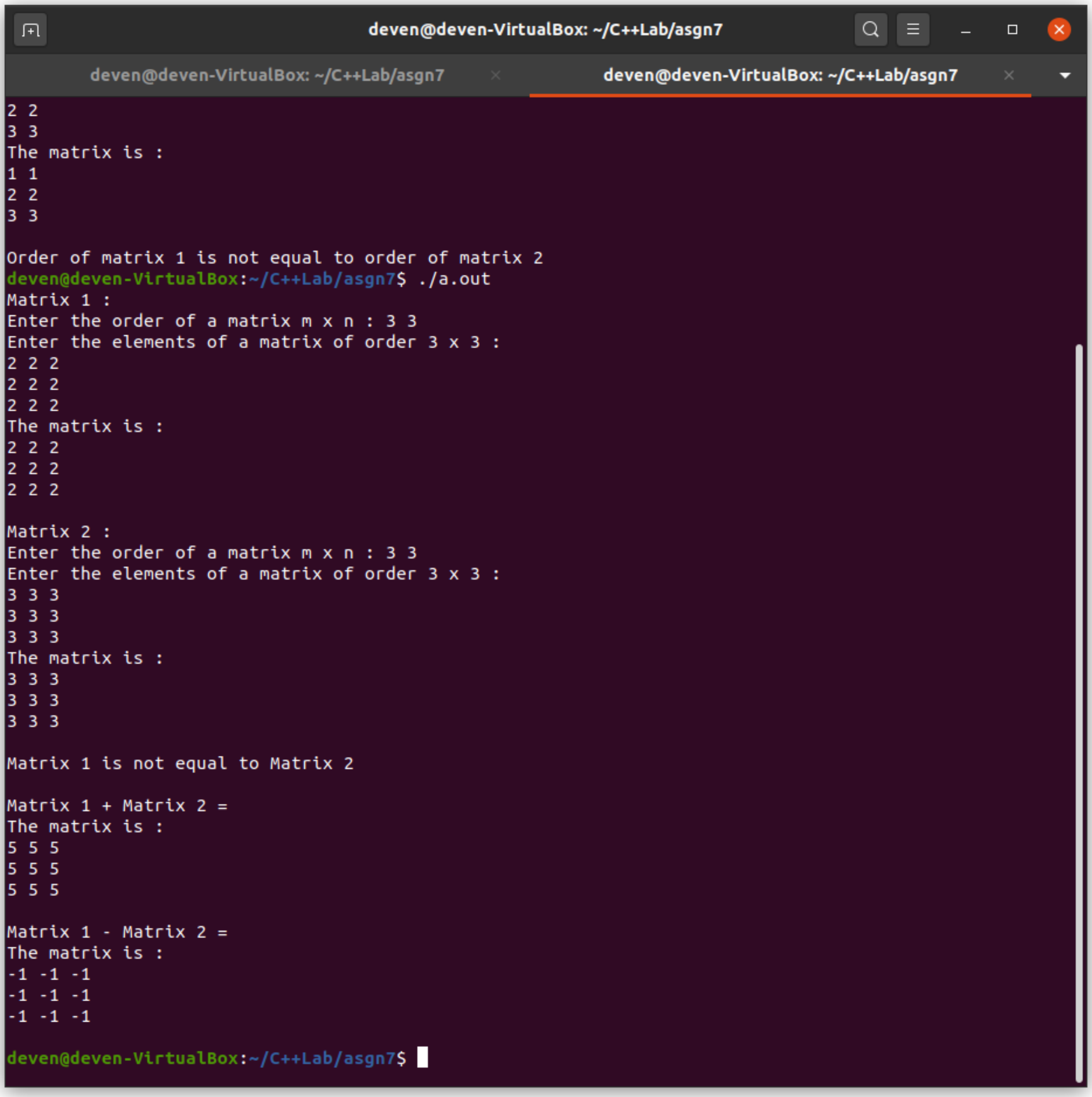
```
deven@deven-VirtualBox:~/C++Lab/asgn7$ g++ matrix2.cpp
deven@deven-VirtualBox:~/C++Lab/asgn7$ ./a.out
Matrix 1 :
Enter the order of a matrix m x n : 2 3
Enter the elements of a matrix of order 2 x 3 :
1 1 1
2 2 2
The matrix is :
1 1 1
2 2 2

Matrix 2 :
Enter the order of a matrix m x n : 3 2
Enter the elements of a matrix of order 3 x 2 :
1 1
2 2
3 3
The matrix is :
1 1
2 2
3 3

Order of matrix 1 is not equal to order of matrix 2
deven@deven-VirtualBox:~/C++Lab/asgn7$ ./a.out
Matrix 1 :
Enter the order of a matrix m x n : 3 3
Enter the elements of a matrix of order 3 x 3 :
2 2 2
2 2 2
2 2 2
The matrix is :
2 2 2
2 2 2
2 2 2

Matrix 2 :
Enter the order of a matrix m x n : 3 3
Enter the elements of a matrix of order 3 x 3 :
3 3 3
3 3 3
3 3 3
The matrix is :
3 3 3
3 3 3
3 3 3

Matrix 1 is not equal to Matrix 2
```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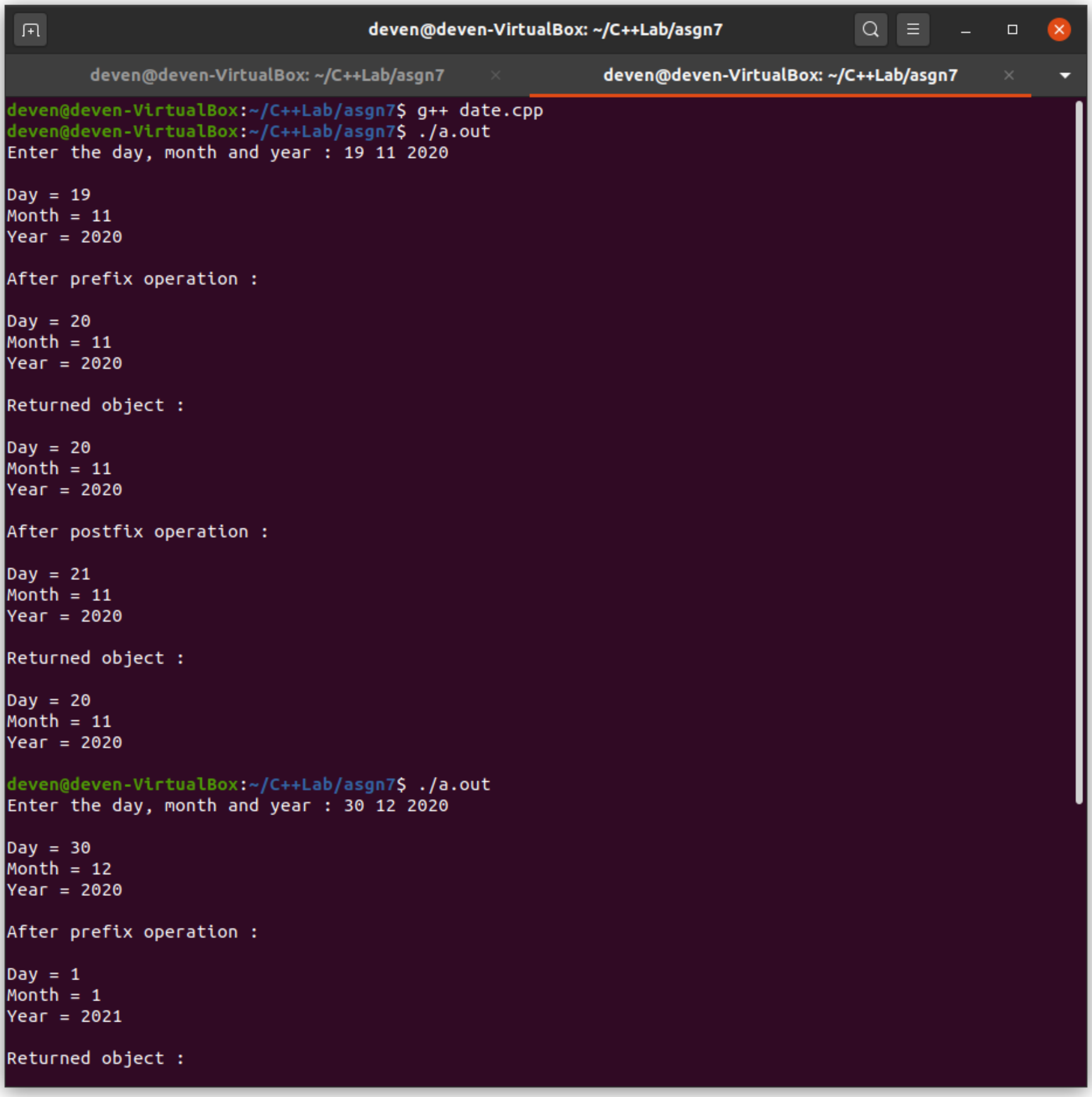
```
2 2
3 3
The matrix is :
1 1
2 2
3 3

Order of matrix 1 is not equal to order of matrix 2
deven@deven-VirtualBox:~/C++Lab/asgn7$ ./a.out
Matrix 1 :
Enter the order of a matrix m x n : 3 3
Enter the elements of a matrix of order 3 x 3 :
2 2 2
2 2 2
2 2 2
The matrix is :
2 2 2
2 2 2
2 2 2

Matrix 2 :
Enter the order of a matrix m x n : 3 3
Enter the elements of a matrix of order 3 x 3 :
3 3 3
3 3 3
3 3 3
The matrix is :
3 3 3
3 3 3
3 3 3

Matrix 1 is not equal to Matrix 2

Matrix 1 + Matrix 2 =
The matrix is :
5 5 5
5 5 5
5 5 5

Matrix 1 - Matrix 2 =
The matrix is :
-1 -1 -1
-1 -1 -1
-1 -1 -1

deven@deven-VirtualBox:~/C++Lab/asgn7$ 
```

2. Consider a class Date with year, month and day. Perform prefix and postfix increment operators for the Date suitably to show the new values.

```
#include <iostream>

using namespace std;


class Date

{
    private :
        int day, month, year;
    public :
        Date(int d = 0, int m = 0, int y = 0) : day(d), month(m), year(y) {}
        void read();
        Date operator++();
        Date operator++(int);
        void display();
};

void Date::read()
{
    cout << "Enter the day, month and year : ";
    cin >> day >> month >> year;
}

Date Date::operator++()
{
    ++day;
    month += (day/30);
    year += (month/12);
    month %= 12;
    day %= 30;
    //return Date(day, month, year);
    return *this;
}
```

```
Date Date::operator++(int)
{
        int d = day++, m = month, y = year;
        month += (day/30);
        year += (month/12);
        month %= 12;
        day %= 30;
        return Date(d, m, y);
}

void Date::display()
{
        cout << endl;
        cout << "Day = " << day << endl;
        cout << "Month = " << month << endl;
        cout << "Year = " << year << endl;
        cout << endl;
}

int main()
{
        Date d;
        d.read();
        d.display();
        Date e = ++d;
        cout << "After prefix operation : " << endl;
        d.display();
        cout << "Returned object : " << endl;
        e.display();
        e = d++;
        cout << "After postfix operation : " << endl;
        d.display();
        cout << "Returned object : " << endl;
        e.display();
        return 0;
}
```



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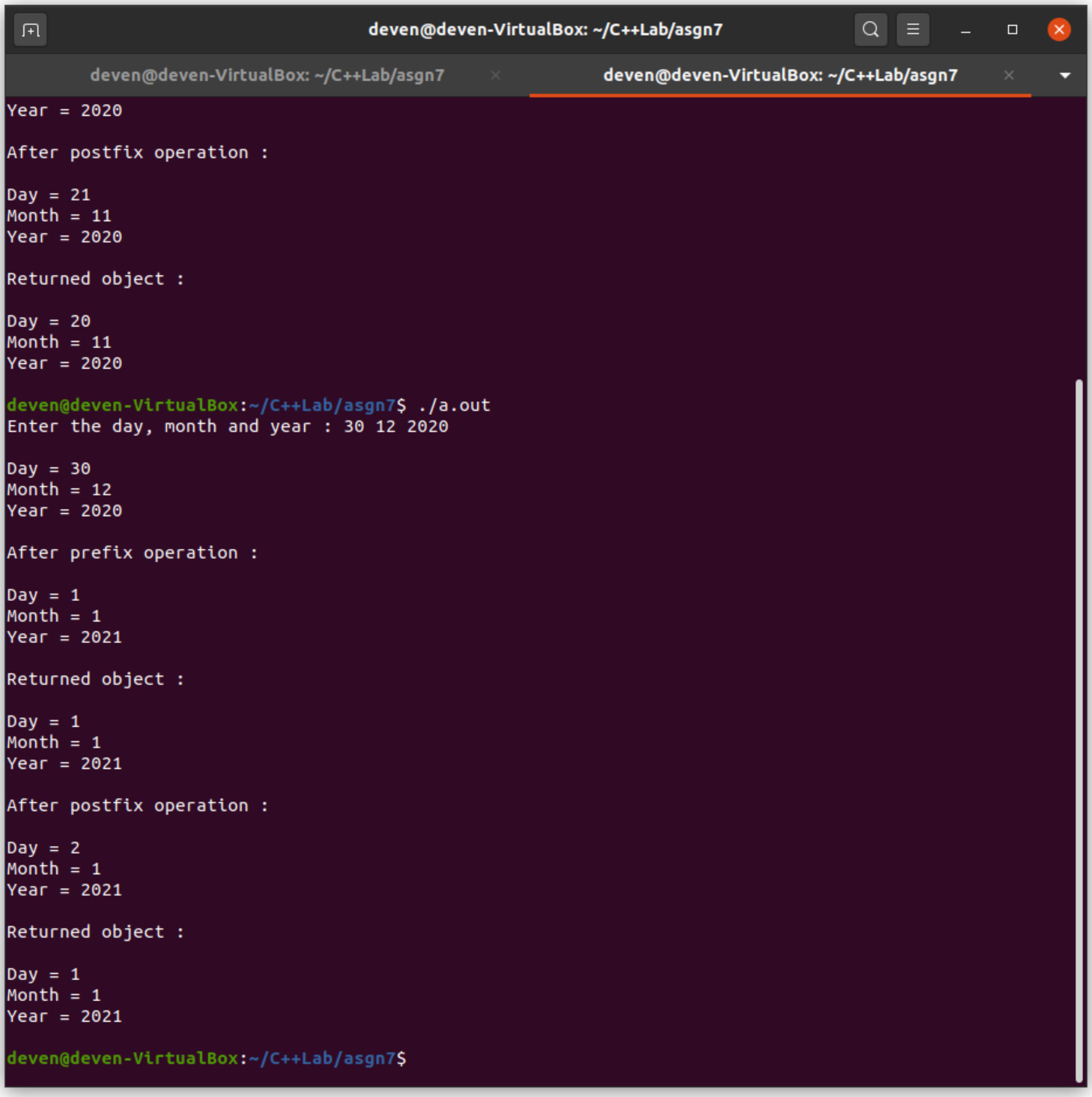
```
deven@deven-VirtualBox:~/C++Lab/asgn7$ g++ date.cpp
deven@deven-VirtualBox:~/C++Lab/asgn7$ ./a.out
Enter the day, month and year : 19 11 2020

Day = 19
Month = 11
Year = 2020

After prefix operation :

Day = 20
Month = 11
Year = 2020

Returned object :

Day = 20
Month = 11
Year = 2020

After postfix operation :

Day = 21
Month = 11
Year = 2020

Returned object :

Day = 20
Month = 11
Year = 2020

deven@deven-VirtualBox:~/C++Lab/asgn7$ ./a.out
Enter the day, month and year : 30 12 2020

Day = 30
Month = 12
Year = 2020

After prefix operation :

Day = 1
Month = 1
Year = 2021

Returned object :
```



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```
Year = 2020

After postfix operation :

Day = 21
Month = 11
Year = 2020

Returned object :

Day = 20
Month = 11
Year = 2020

deven@deven-VirtualBox:~/C++Lab/asgn7$ ./a.out
Enter the day, month and year : 30 12 2020

Day = 30
Month = 12
Year = 2020

After prefix operation :

Day = 1
Month = 1
Year = 2021

Returned object :

Day = 1
Month = 1
Year = 2021

After postfix operation :

Day = 2
Month = 1
Year = 2021

Returned object :

Day = 1
Month = 1
Year = 2021

deven@deven-VirtualBox:~/C++Lab/asgn7$
```

3. Consider a class Student with marks. Compare marks of two students using comparison operators.

```
#include <iostream>

using namespace std;


class student

{
    private:
        int id;
        string name;
        int marks[4];
    public:
        void read();
        void display();
        bool operator==(student);
        bool operator>(student);
};

void student::read()
{
    cout << "Enter the student's id and name : " << endl;
    cin >> id >> name;
    cout << "Enter the 4 courses marks : " << endl;
    for(int i = 0; i < 4; ++i)
        cin >> marks[i];
}

void student::display()
{
    cout << "Student details : " << endl;
    cout << "Id : " << id << endl;
    cout << "Name : " << name << endl;
    cout << "Marks in the 4 courses : " << endl;
```

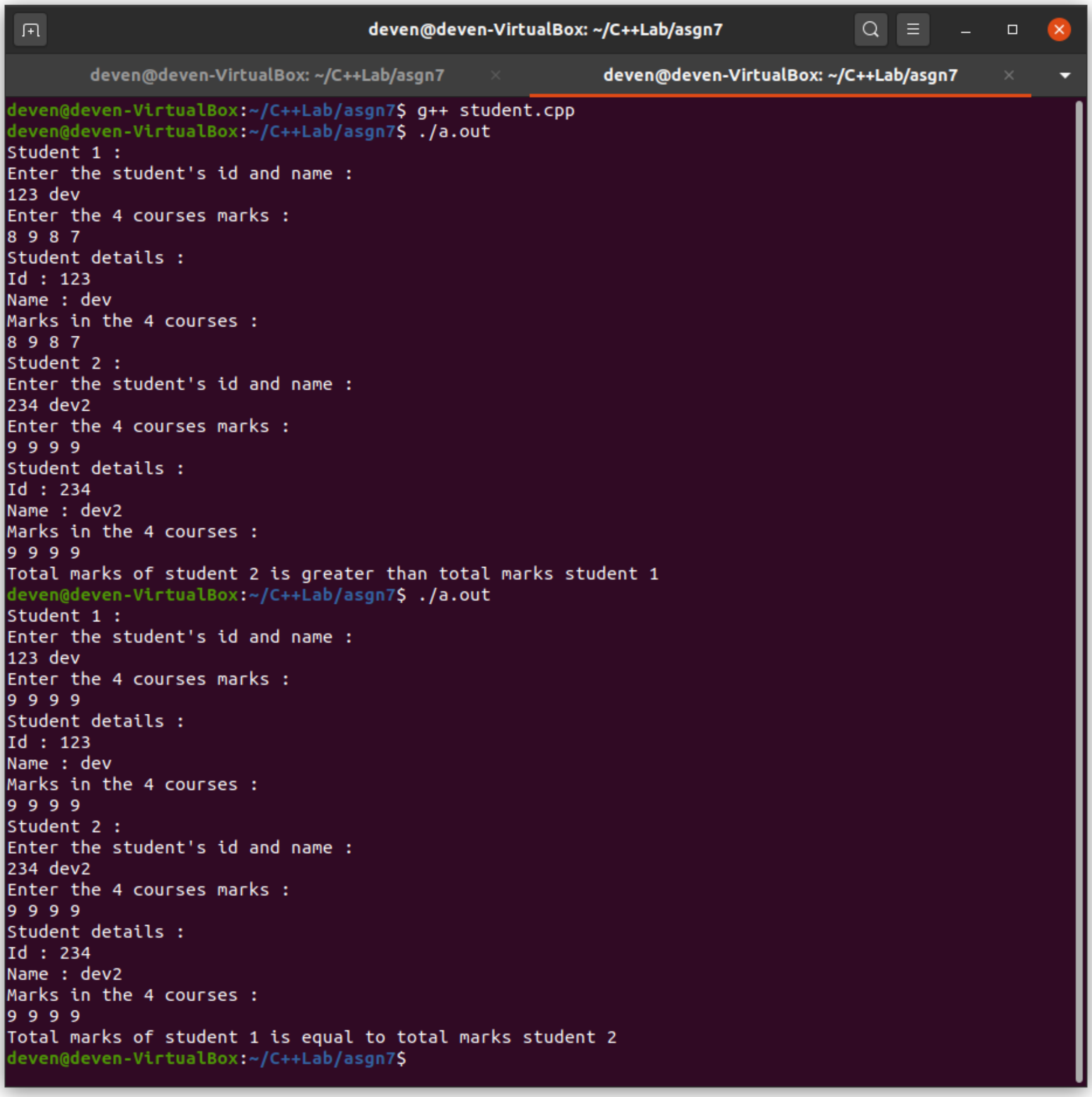
```
        for(int i = 0; i < 4; ++i)
                cout << marks[i] <<" ";
        cout << endl;
}

bool student::operator==(student s2)
{
        int sum1 = 0, sum2 = 0;
        for(int i = 0; i < 4; ++i)
        {
                sum1 += marks[i];
                sum2 += s2.marks[i];
        }
        if(sum1==sum2)
                return true;
        return false;
}

bool student::operator>(student s2)
{
        int sum1 = 0, sum2 = 0;
        for(int i = 0; i < 4; ++i)
        {
                sum1 += marks[i];
                sum2 += s2.marks[i];
        }
```

```
    if(sum1>sum2)
        return true;
    return false;
}

int main()
{
    student s1, s2;
    cout << "Student 1 :" << endl;
    s1.read();
    s1.display();
    cout << "Student 2 :" << endl;
    s2.read();
    s2.display();
    if(s1 == s2)
        cout << "Total marks of student 1 is equal to total marks student 2" << endl;
    else if(s1 > s2)
        cout << "Total marks of student 1 is greater than total marks student 2" << endl;
    else
        cout << "Total marks of student 2 is greater than total marks student 1" << endl;
    return 0;
}
```



deven@deven-VirtualBox: ~/C++Lab/asgn7
deven@deven-VirtualBox: ~/C++Lab/asgn7
deven@deven-VirtualBox: ~/C++Lab/asgn7

```
deven@deven-VirtualBox:~/C++Lab/asgn7$ g++ student.cpp
deven@deven-VirtualBox:~/C++Lab/asgn7$ ./a.out
Student 1 :
Enter the student's id and name :
123 dev
Enter the 4 courses marks :
8 9 8 7
Student details :
Id : 123
Name : dev
Marks in the 4 courses :
8 9 8 7
Student 2 :
Enter the student's id and name :
234 dev2
Enter the 4 courses marks :
9 9 9 9
Student details :
Id : 234
Name : dev2
Marks in the 4 courses :
9 9 9 9
Total marks of student 2 is greater than total marks student 1
deven@deven-VirtualBox:~/C++Lab/asgn7$ ./a.out
Student 1 :
Enter the student's id and name :
123 dev
Enter the 4 courses marks :
9 9 9 9
Student details :
Id : 123
Name : dev
Marks in the 4 courses :
9 9 9 9
Student 2 :
Enter the student's id and name :
234 dev2
Enter the 4 courses marks :
9 9 9 9
Student details :
Id : 234
Name : dev2
Marks in the 4 courses :
9 9 9 9
Total marks of student 1 is equal to total marks student 2
deven@deven-VirtualBox:~/C++Lab/asgn7$
```