CSE208L Computer Programming Lab

LAB # 5

2020

Submitted to:

Engr. Sumayya Salahuddin

Submitted by:

TAYYABA

Registration No :

19PWCSE1854

Semester: 3nd

Class Section: C

NOV, 26 , 2020

Department of Computer Systems Engineering

University of Engineering and Technology, Peshawar

University of Engineering and Technology, Peshawar

Objectives of the Lab:

Objectives of the lab are to:

- Understand how class object can be passed and returned from class member function.
- Write a class with member function having objects as arguments.
- Write a class with member function that return object.
- Test member function effectively using given test cases.

ACTIVITY # 01

Title:

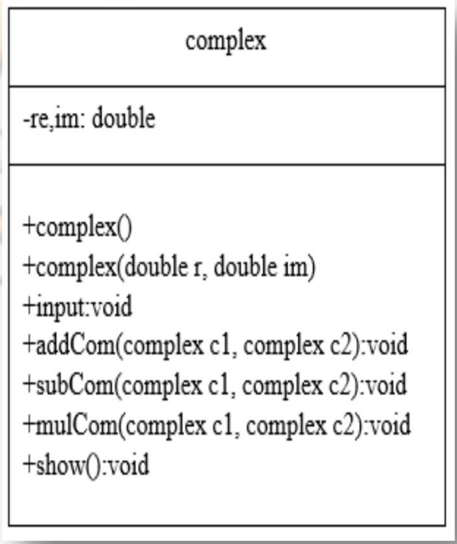
Make a class for complex number and model it uses real and imaginary part.

Problem analysis:

Create a class, **complex** that contains a twice double field, **real & imaginary**. Define a constructor that takes no parameters. The **real & imaginary** field should be set to the value 0 in the constructor. Define another constructor that takes two parameters. Define a function **input** for take the complex number from user. **Define** the functions **addCom, subCom** and **mulCom** which is used to add, subtract and multiply the two complex numbers . Define another function **show** for display the result of addition, subtraction & multiplication.

Algorithm:

UML diagram for the above problem is given below:



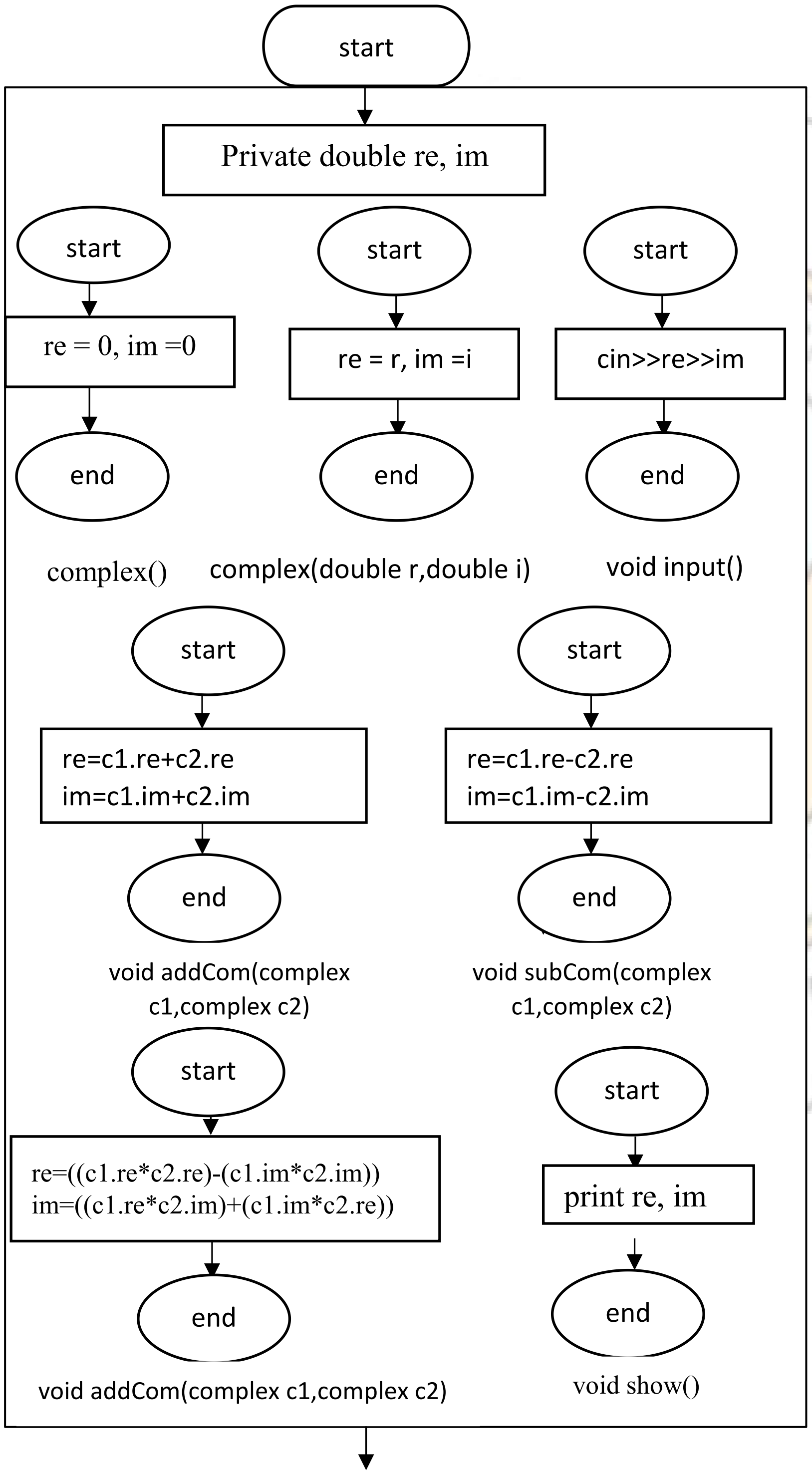
complex

-re,im: double

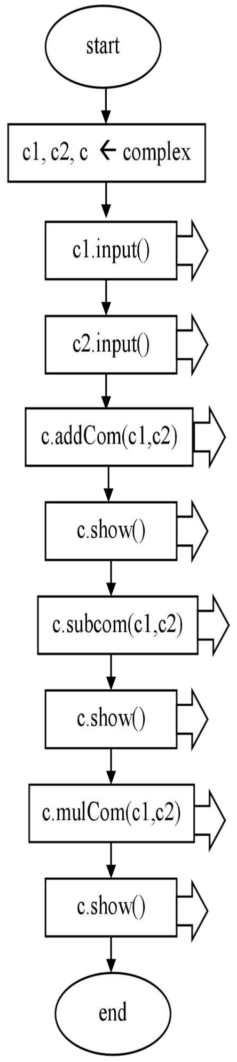
+complex()
+complex(double r, double im)
+input:void
+addCom(complex c1, complex c2):void
+subCom(complex c1, complex c2):void
+mulCom(complex c1, complex c2):void
+show():void

- First make class complex.
- Declare real and imaginary as private double field.
- Define no argument constructor to set value of real & imaginary to 0.
- Define argument constructor to set value of real & imaginary to given values.
- Define input function for taking the real and imaginary part of objects to the user.
- Define add, subtract and multiply function for performing some arithmetic operations.
- Define show function to display the result of function.
- In main function, make objects of complex to demonstrate the use of complex number.
- Call each function one after the other and display the show function as shown in the flow chart.

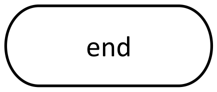
Flowchart:



start
Private double re, im
start
re = 0, im =0
end
complex()
start
re = r, im =i
end
complex(double r,double i)
start
cin>>re>>im
end
void input()
start
re=c1.re+c2.re
im=c1.im+c2.im
end
void addCom(complex c1,complex c2)
start
re=c1.re-c2.re
im=c1.im-c2.im
end
void subCom(complex c1,complex c2)
start
re=((c1.re*c2.re)-(c1.im*c2.im))
im=((c1.re*c2.im)+(c1.im*c2.re))
end
void addCom(complex c1,complex c2)
start
print re, im
end
void show()



start
c1, c2, c ← complex
c1.input()
c2.input()
c.addCom(c1,c2)
c.show()
c.subcom(c1,c2)
c.show()
c.mulCom(c1,c2)
c.show()
end



In C++

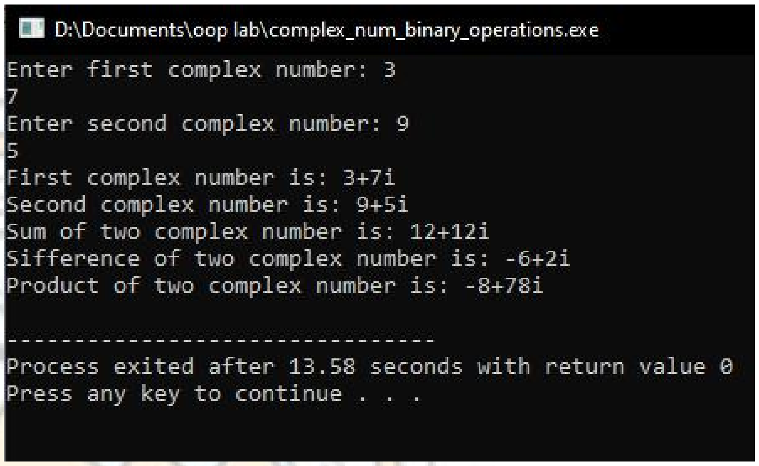
Source code:

```
#include<iostream>
using namespace std;
//create a class
class complex{
    private:
        double re,im;
    public:
        complex();
        complex(double r, double
i);
        void addCom(complex c1, complex c2);
        void subCom(complex c1, complex c2);
        void mulCom(complex c1, complex c2);
        void input();
        void show();
};

complex::complex():re(0),im(0){}; //constructor
complex::complex(double r, double i):re(r),im(i){}; //constructor

void  complex::input()
{
    cin>>re;
    cin>>im;
}
```

Output



```
D:\Documents\oop lab\complex_num_binary_operations.exe
Enter first complex number: 3
7
Enter second complex number: 9
5
First complex number is: 3+7i
Second complex number is: 9+5i
Sum of two complex number is: 12+12i
Sifference of two complex number is: -6+2i
Product of two complex number is: -8+78i

--------------------------------
Process exited after 13.58 seconds with return value 0
Press any key to continue . . .
```

```
void complex::addCom(complex c1, complex c2)
{
    re=c1.re+c2.re;
    im=c1.im+c2.im;
}

void complex::subCom(complex c1, complex c2)
{
    re=c1.re-c2.re;
    im=c1.im-c2.im;
}

void complex::mulCom(complex c1, complex c2)
{
    re=((c1.re*c2.re)-(c1.im*c2.im));
    im=((c1.re*c2.im)+(c1.im*c2.re));
}

void complex::show()
{
    cout<<re<<"+"<<im<<"i"<<endl;
}

int main()
{
    complex c1, c2,c;
    cout<<"Enter first complex number: ";
    c1.input();
    cout<<"Enter second complex number: ";
    c2.input();
    cout<<"First complex number is: ";c1.show();
    cout<<"Second complex number is: ";c2.show();
    c.addCom(c1,c2);
    cout<<"Sum of two complex number is: ";c.show();
    c.subCom(c1,c2);
    cout<<"Difference of two complex number is: ";c.show();
    c.mulCom(c1,c2);
    cout<<"Product of two complex number is: ";c.show();
    return 0;
}
```

Conclusion:

This program helps us in understanding the basic concepts of classes and objects in different languages. It acts as a base for us and helps us in preparing ourselves for the higher level of programming. We get to know about how to pass argument to the function of class in OOP with the help of this program.

Activity # 02

Title:

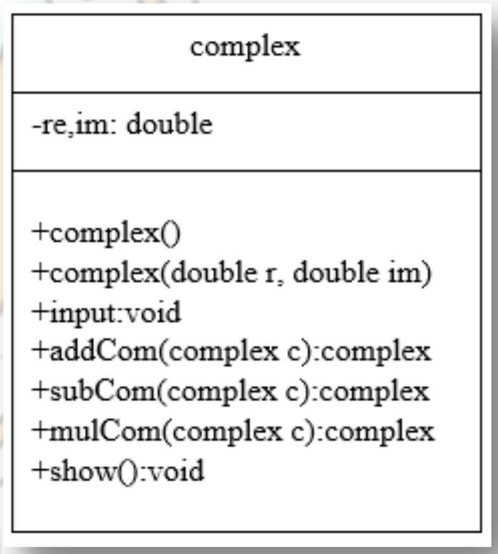
Make a class for complex number and model it uses real and imaginary part.

Problem analysis:

Create a class, **complex** that contains a twice double field, **real & imaginary**. Define a constructor that takes no parameters. The **real & imaginary** field should be set to the value 0 in the constructor. Define another constructor that takes two parameters. Define a function **input** for take the complex number from user. **Define** the functions **addCom, subCom** and **mulCom** which is used to add, subtract and multiply the two complex numbers . Define another function **show** for display the result of addition, subtraction & multiplication.

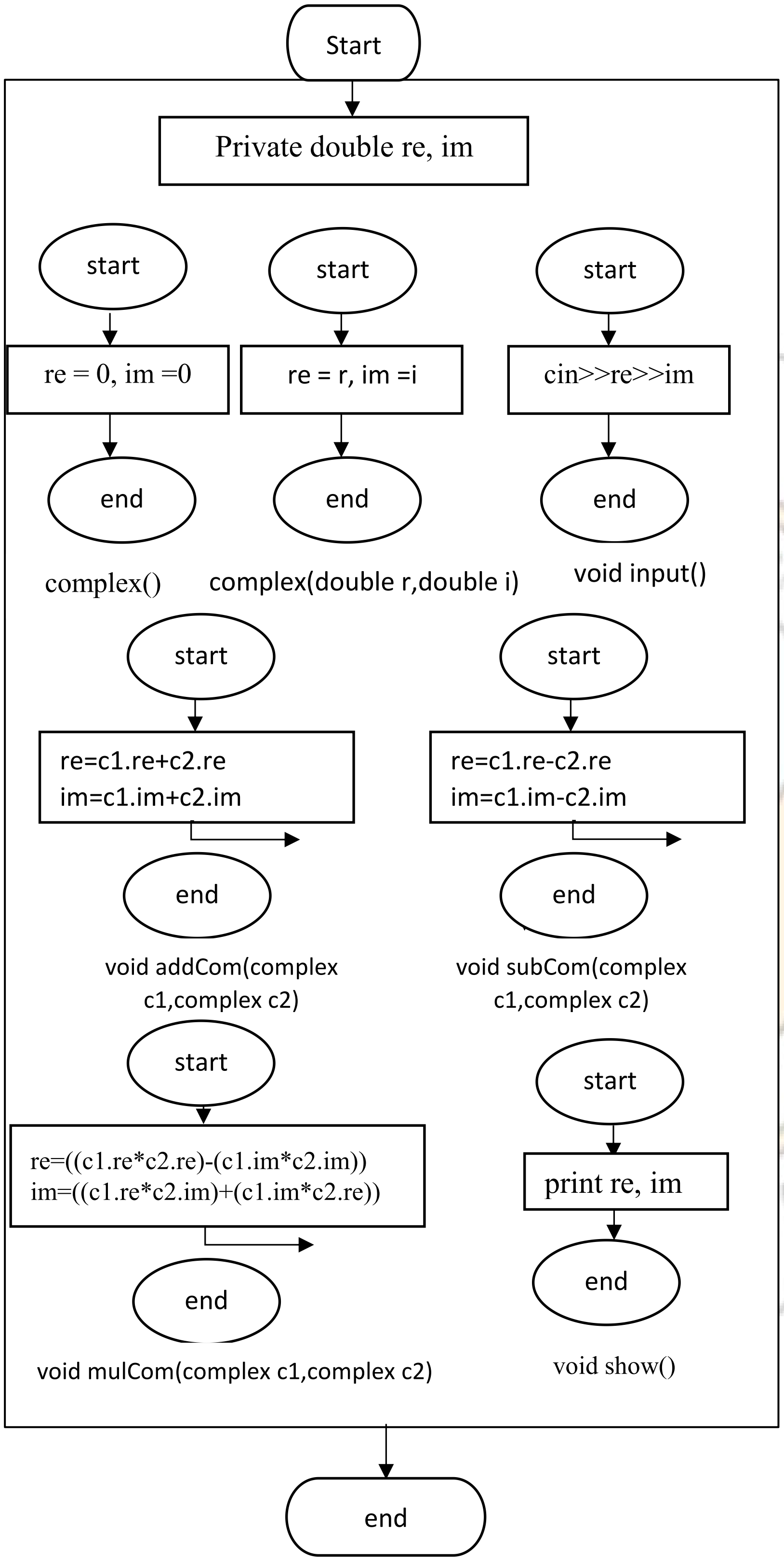
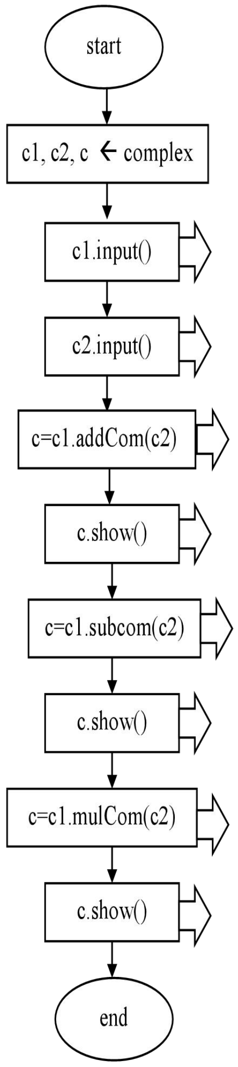
Algorithm:

UML diagram for the above problem is given below:


complex
-re,im: double
+complex()
+complex(double r, double im)
+input:void
+addCom(complex c):complex
+subCom(complex c):complex
+mulCom(complex c):complex
+show():void

- First make class complex.
- Declare real and imaginary as private double field.
- Define no argument constructor to set value of real & imaginary to 0.
- Define argument constructor to set value of real & imaginary to given values.
- Define input function for taking the real and imaginary part of objects to the user.
- Define add, subtract and multiply function for performing some arithmetic operations and return the result.
- Define show function to display the result of function.
- In main function, make objects of complex to demonstrate the use of complex number.
- Call each function one after the other and display the show function as shown in the flow chart.

Flowchart:

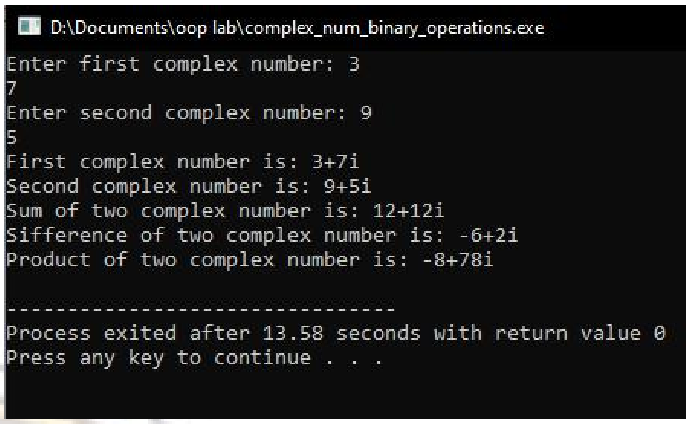

Start
Private double re, im
start
re = 0, im =0
end
complex()
start
re = r, im =i
end
complex(double r,double i)
start
cin>>re>>im
end
void input()
start
re=c1.re+c2.re
im=c1.im+c2.im
end
void addCom(complex c1,complex c2)
start
re=c1.re-c2.re
im=c1.im-c2.im
end
void subCom(complex c1,complex c2)
start
re=((c1.re*c2.re)-(c1.im*c2.im))
im=((c1.re*c2.im)+(c1.im*c2.re))
end
void mulCom(complex c1,complex c2)
start
print re, im
end
void show()
end

start
c1, c2, c ← complex
c1.input()
c2.input()
c=c1.addCom(c2)
c.show()
c=c1.subcom(c2)
c.show()
c=c1.mulCom(c2)
c.show()
end

In C++

Source code:

Output

```
#include<iostream>
using namespace std;
class complex{
    private:
        double re,im;
    public:
        complex();
        complex(double r, double i);
        complex addCom(complex c1);
        complex subCom(complex c1);
        complex mulCom(complex c1);
        void input();
        void show();
};
complex::complex():re(0),im(0){}; //constructor
complex::complex(double r, double i):re(r),im(i){}; //constructor
void  complex::input()
{
    cin>>re;
    cin>>im;
}
complex complex::addCom(complex c1)
{
    complex temp;
    temp.re=c1.re+re;
    temp.im=c1.im+im;
    return temp;
}
complex complex::subCom(complex c1)
```



```
D:\Documents\oop lab\complex_num_binary_operations.exe
Enter first complex number: 3
7
Enter second complex number: 9
5
First complex number is: 3+7i
Second complex number is: 9+5i
Sum of two complex number is: 12+12i
Sifference of two complex number is: -6+2i
Product of two complex number is: -8+78i

--------------------------------
Process exited after 13.58 seconds with return value 0
Press any key to continue . . .
```

```
{
    complex temp;
    temp.re=c1.re-re;
    temp.im=c1.im-im;
    return temp;
}
complex complex::mulCom(complex c1)
{
    complex temp;
    temp.re=((c1.re*re)-(c1.im*im));
    temp.im=((c1.re*im)-(c1.im*re));
    return temp;
}
void complex::show()
{
    cout<<re<<"+"<<im<<"i"<<endl;
}
int main()
{
    complex c1, c2,c;
    cout<<"enter first complex number: ";
    c1.input();
    cout<<"enter second complex number: ";
    c2.input();
    cout<<"first complex number is: ";c1.show();
    cout<<"second complex number is: ";c2.show();
    c=c2.addCom(c1);
    cout<<"sum of two complex number is: ";c.show();
    c=c2.subCom(c1);
    cout<<"difference of two complex number is: ";c.show();
    c=c2.mulCom(c1);
    cout<<"product of two complex number is: ";c.show();
    return 0;
}
```

Activity # 03

Title:

Make a class for Integer Set and model it uses integer array.

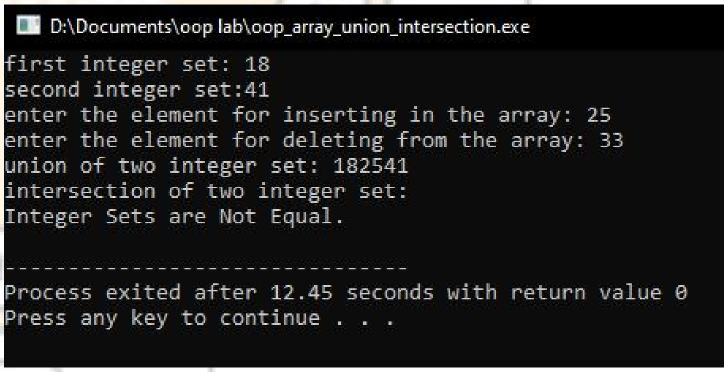
Problem analysis:

Create a class called ***IntegerSet*** that models how to use integer sets. The program creates an integer array, displays the integer set, makes a NewIntegerSet function to initialize the integer array, then make a union &intersection function for union and intersect the two arrays by making two objects of the class and then displays the union and intersection result. Also make two another function for inserting and deleting the element in the array.

Source code:

```
#include <iostream>
#include <cstdlib>
using namespace std;
const int SIZE=50;
class IntegerSet{
private:
  int Array[SIZE];
public:
  IntegerSet(){
    for (int i=0;i<SIZE;i++)
    {
      Array[i]=0;
    }
  }
  void NewIntegerSet(int n[])
  {
```

Output:



D:\Documents\oop lab\oop_array_union_intersection.exe

```
first integer set: 18
second integer set:41
enter the element for inserting in the array: 25
enter the element for deleting from the array: 33
union of two integer set: 182541
intersection of two integer set:
Integer Sets are Not Equal.

--------------------------------
Process exited after 12.45 seconds with return value 0
Press any key to continue . . .
```

```
   for(int i=0;i<SIZE;i++)
   {
      for (int j=0;j<SIZE;j++)
      {
         if (n[j]==i)
            Array[i]=1;
         else
            Array[i]=0;
      }
   }
}
void SetPrint()
{
   for (int i=0;i<SIZE;i++)
   {
      if (Array[i]==1)
      {
         cout<<i;
      }
   }
   cout<<endl;
}
void InsertElement(int k)
{
   Array[k]=1;
}
void DeleteElement(int m)
{
   Array[m]=0;
```

```
}
IntegerSet UnionOfIntegerSet(IntegerSet N)
{
   IntegerSet temp;
   for(int i=0;i<SIZE;i++)
   {
      if (N.Array[i] || Array[i])
         temp.Array[i]=1;
      else
         temp.Array[i]=0;
   }
   return temp;
}
IntegerSet IntersectionOfIntegerSet(IntegerSet N)
{
   IntegerSet temp;
   for(int i=0;i<SIZE;i++)
   {
      if ((!(N.Array[i]) || !(Array[i])))
      {
         temp.Array[i]=0;
      }
      else
         temp.Array[i]=1;
   }
   return temp;
}
void IsEqualTo(IntegerSet N)
{
```

```
            int counter=0;
            for(int i=0;i<SIZE;i++)
            {
                if (N.Array[i]==Array[i])
                    counter++;
            }
            if (counter==SIZE)
                cout<<"Integer Sets are Equal."<<endl;
            else
                cout<<"Integer Sets are Not Equal."<<endl;
        }
};
int main()
{
    int num;
    int x[SIZE],y[SIZE];
    for(int i=0;i<SIZE;i++)
    {
        x[i]=rand()%50;
    }
    for(int i=0;i<SIZE;i++)
    {
        y[i]=rand()%50;
    }
    IntegerSet i1,i2,i3;
    cout<<"first integer set: ";
    i1.NewIntegerSet(x);
    i1.SetPrint();
    i2.NewIntegerSet(y);
    cout<<"second integer set:";
    i2.SetPrint();
    cout<<"enter the element for inserting in the array: ";
    cin>>num;
    i1.InsertElement(num);
    cout<<"enter the element for deleting from the array: ";
    cin>>num;
    i1.DeleteElement(num);
    i3= i1.UnionOfIntegerSet(i2);
    cout<<"union of two integer set: ";
    i3.SetPrint();
    i3 = i1.IntersectionOfIntegerSet(i2);
    cout<<"intersection of two integer set: ";
    i3.SetPrint();
    i1.IsEqualTo(i2);
    return 0;
}
```