Course:	Session: Abstract Class Virtual Function and Friend Function	Timestamp: 2021-4-1 10:41:34	Register Number: RA2031241010094
OOPS			

Q. Difference Problem

Mandatory:
1. Create an Abstract class as "parent"

2. Declare a virtual function as public member as following:
Hint : virtual void difference(int a, int b)=0;

3. Create a child class as "derived" by inheriting "parent" class
Hint : class child:public parent

4. Define the difference() function in Derived class with two parameter
a. Function Name = difference()
b. Return type = void()
c. Argument = Two argument of type integer
d. Usage = To display the difference of two values.

In main method:

1.Create pointer instance for base class: parent *p;

2. Create an instance for derived class: child c;

3. Assign the address of d to pointer b:
Hint: p=&c;

4. Declare a variable and read it:
Hint: int n; cin>>a>>b;

5. Call the sum function using b:
Hint: p->difference(a,b);

Refer Sample testcases.

Programming language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class parent
{
  public:
  virtual void difference(int a,int b)=0;
};
class child:public parent
{
public:
int z;
void difference(int a,int b)
{
z=a-b;
cout<<"Difference="<<z;
}
};
int main()
{
  parent *p;
  child c;
  p=&c;
  int a,b;
  cin>>a>>b;
  p->difference(a,b);
 return 0;
}
```

Sample Input

189 172

Sample Output

Difference=17

Result

Thus, Program " **Difference Problem** " has been successfully executed

Course:	**Session:** Abstract Class Virtual Function and Friend Function	**Timestamp:** 2021-4-1 10:41:58	**Register Number:**
OOPS			RA2031241010094

Q. Jaganath and his Juniours

Jaganath the Developer is trying to analyze the operation of Post increment.Fot that purpose he has give some of the tasks to his juniors in the team.

But he has the following restriction in doing that task

Mandatory:

1. Define a class name "Point" with one data member and three member functions. (Two functions and one constructor)

2. Define a parameterized Constructor for the class "Point" that takes one argument.

Name = Point()
Arguments = One Argument
Type = Integer
Usage = Assigns the value to the data member of the class
Hint: Point(int px)

3. Define a function named "show"

Name= show()
Arguments= default argument
Access specifier=public
type = void
Usage=Display the value of the data member.

4. Define a function overloading ++ operator(as friend Data type operator++(classname &))

Hint = friend void operator++(Point &

5. Define the operator overloading as follows:
Hint = void operator++(Point &p)

6. In main function create object for class "Point" and object name as "ob1" that takes one argument. [The Value to be Incremented]

7.Invoke show() method from main using the object "ob1".

Can you help they to complete the task given by Jaganath??

Programming language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class Point
{
  int px;
  public:
  Point(int px)
  {
    this->px=px;
  }
  void show()
  {
    cout<<px<<endl;
  }
  friend void operator++(Point &);
  };
void operator++(Point &p)
{
  p.px++;
}
int main()
{
  int px;
  cin>>px;
  Point ob1(px);
  ++ob1;
  ob1.show();
 return 0;
}
```

Sample Input

179

Sample Output

180

Result

Thus, Program " **Jaganath and his Juniours** " has been successfully executed

Course:	**Session:** Abstract Class Virtual Function and Friend Function	**Timestamp:** 2021-4-1 10:42:29	**Register Number:**
OOPS			RA2031241010094

Q. Kajal and her Shopping

Kajal is the newly married women went to super market for his family shopping.Since she has purchased lot of items.There was a two separate bills given by the representative in super market.So kajal is interested in calculating the average amount she spent in the shopping.

Help her to find it.Get the total amount of two bills and find the average amount spent by kajal.

Mandatory:

1. Create a class named "Bill"
2. Create a method named "getamount" of type void to get the amount of two bills.
3. Use the friend function named "billavg" of type float to calculate the average amount spent for shopping.
4. Create a object named "obj" for class Bill.
5. Access the friend function "billavg" using the object of Bill class in the main method.

Refer Sample testcases.

Programming language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class Bill
{
  public:
  int a,b;
  void getamount()
  {
    cin>>a>>b;
  }
  friend float billavg(Bill&,int,int);
};
float billavg(Bill &x,int a,int b)
{
  float y;
  y=(a+b);
  return y/2;
}
int main()
{
  Bill obj;
  obj.getamount();
 cout<<"Average amount spent:"<<billavg(obj,obj.a,obj.b);
 return 0;
}
```

Sample Input

```
1567
1965
```

Sample Output

```
Average amount spent:1766
```

Result

Thus, Program " **Kajal and her Shopping** " has been successfully executed

Course:	Session: Abstract Class Virtual Function and Friend Function	Timestamp: 2021-4-1 10:42:55	Register Number:
OOPS			RA2031241010094

Q. Numbers

Suresh is interested in finding the sum of N numbers but he wants to do it using the concept of virtual function.

Can you help him to do it?

Mandatory:
1. Create an Base class as "Super"

2. Declare a virtual function as public member as following:
Hint : virtual void nSum()=0;

3. Create a child class as "Sub" by inheriting "Super" class
Hint : class Sum:public Super

4. Define three data members of type integer and two functions as follows:

5. Define the first function read() in Sub class with default parameter
a. Function Name = read()
b. Return type = void()
c. Argument = Default argument
d. Usage = To Input the value for finding sum of "n" numbers.

6. Define the second function nSum() in Sub class with default parameter
a. Function Name = nSum()
b. Return type = void()
c. Argument = Default argument
d. Usage = To compute the sum of "n" numbers and display the result

In main method:

1.Create pointer instance for base class: Super *s;

2. Create an instance for derived class: Sub sb;

3. Assign the address of s to pointer sb:
Hint: s=&sb;

4. Call the read() function using instance of Sub class:
Hint: sb.read();

5. Call the nSum function using instance of super class:
Hint: s->nSum();

Refer sample test cases.

Programming language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class Super
{
  public:
  virtual void nSum()=0;
};
class Sub:public Super
{
int n,a,b;
public:
void read()
{
cin>>n;
}
void nSum()
{
cout<<(n*(n-1)/2)+n<<endl;
}
};
int main()
{
  Super *s;
  Sub sb;
  s=&sb;
  sb.read();
  s->nSum();
 return 0;
}
```

Sample Input

25

Sample Output

325

Result

Thus, Program " **Numbers** " has been successfully executed

Course:	Session: Abstract Class Virtual Function and Friend Function	Timestamp: 2021-4-1 10:43:21	Register Number: RA2031241010094
OOPS			

Q. ONGC

ONGC has the set of employees who were developers contributing to the automation of some of the manual process of the organization.
Developers usually used to travel from one plant to another inside the organization for which they are provided the cap with separate driver.
For the purpose of Annual appraisal ONGC is collecting the salary details of Developers and their cab drivers.
Can you help them to automate these data collection process?
Mandatory:
1.Create a abstract bass class named "Employee"
2.Create a pure virtual function named "getSalary" of type int.
virtual int getSalary()=0;
3.Create a class "Developer" derived from class "Employee" and get the salary of developer.
4.Create a class "Driver" derived from class "Employee" and get the salary of driver.
5.Invoke the getSalary function from the main method and display the result.
Refer Sample Testcases.
Programming Language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class Employee
{
  public:
  virtual int getSalary()=0;
};
class Developer:public Employee
{
public:
int salary;
int getSalary()
{
cin>>salary;
cout<<"Salary of Developer : "<<salary<<endl;
}
};
class Driver:public Employee
{
  public:
  int getSalary()
  {
    int salary;
    cin>>salary;
    cout<<"Salary of Driver : "<<salary;
  }
};
int main()
{
  Developer d;
  d.getSalary();
  Driver w;
  w.getSalary();
 return 0;
}
```

Sample Input

```
10465
4325
```

Sample Output

```
Salary of Developer : 10465
Salary of Driver : 4325
```

Result

Thus, Program " **ONGC** " has been successfully executed

Course:	Session: Abstract Class Virtual Function and Friend Function	Timestamp: 2021-4-1 10:43:46	Register Number:
OOPS			RA2031241010094

Q. Super Market

Mohan the owner of new super market is looking for the automated software for calculating the total price of the items purchased by the customer.

Mandatory:

1.Create a class named "consumer"

2.Create a class named "transaction" derived from the consumer class.

3.Both the classes should have the overridden member functions getdata() and display() to get the items and to display the total price of the items respectively.

4.The functions in the base class should be VIRTUAL .

You should used the virtual function concept in order to get evaluated to 100%

Refer Sample testcases.

Programming language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class consumer
{
  public:
  virtual void getdata()=0;
  virtual void display()=0;
};
class transaction:public consumer
{
public:
int c,q,p,tp;
long t;
char n[100];
void getdata()
{
cin>>n>>c>>t>>q>>p>>tp;
}
void display()
{
cout<<"Name : "<<n<<endl;
cout<<"Code : "<<c<<endl;
cout<<"Telephone : "<<t<<endl;
cout<<"Quantity : "<<q<<endl;
cout<<"Price : "<<p<<endl;
tp=q*p;
cout<<"Total Price : "<<tp<<endl;
}
};
int main()
{
  consumer *c;
  transaction t;
  c=&t;
  c->getdata();
  c->display();
 return 0;
}
```

Sample Input

```
Janani
5
8374928450
5
299
```

Sample Output

```
Name : Janani
Code : 5
Telephone : 8374928450
Quantity : 5
Price : 299
Total Price : 1495
```

Result

Thus, Program " **Super Market** " has been successfully executed

Course:	**Session:** Abstract Class Virtual Function and Friend Function	**Timestamp:** 2021-4-1 10:44:11	**Register Number:**
OOPS			RA2031241010094

Q. Engineering Counselling

Jayakanthan the counseling representative of Anna University Engineering counseling in CEG Campus has a task of calculating the Cut off marks by getting the Maths,Physics and Chemistry marks of the Students.
Since the number of students applied for counseling is big.He is finding it difficult to calculate the cut off marks manually.
Can you help him to complete his task quickly,by getting the required marks and calculating the cut off marks automatically.

Input Format:
First line indicates the number of testcases.
From the second line each line has the Number,Name,Maths Mark,Physics Mark,Chemistry Mark of the student.
Output Format:
The output should have Number, Name, Marks, Total, Cutoff of each student respectively in a separate line.
Mandatory:
1. Create a class named "Counselling"
2.Create a friend class named "enggstudent"
3.Create two member functions in "enggstudent" class named "cutoff" and "display" of type void to calculate the cutoff marks and to display the cutoff respectively.
4.Create an object named "ceg" for the enggstudent class in the main method.
5.Access the cutoff and diaplay member functions using the object "ceg" from the main method to print the cutoff mark of the students appeared for counselling.
Refer sample test cases.
Programming Language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class Counselling
{
  public:
  int num,m1,m2,m3;
  string name;
  void read()
  {
    cin>>num>>name>>m1>>m2>>m3;
  }
  friend class enggstudent;
};
class enggstudent
{
  float co;
  int tot;
  public:
  void cutoff(Counselling c)
  {
    tot=c.m1+c.m2+c.m3;
    co=tot/3.0;
  }
  void display(Counselling c)
  {
    cutoff(c);
    cout<<c.num<<" "<<c.name<<" "<<"("<<" "<<c.m1<<" "<<c.m2<<" "<<c.m3<<" "<<")"<<" "<<tot<<" "<<co<<endl;
  }
};
int main()
{
  int n;
  cin>>n;
  Counselling c;
  enggstudent ceg;
  cout<<"Number Name Marks Total Cutoff"<<endl;
  for(int i=0;i<n;i++)
  {
    c.read();
  ceg.cutoff(c);
  ceg.display(c);
  }
 return 0;
}
```

Sample Input

```
3
165 Raj 56 78 34
213 Mohan 78 89 96
331 Mani 80 56 78
```

Sample Output

```
Number Name Marks Total Cutoff
165 Raj ( 56 78 34 ) 168 56
213 Mohan ( 78 89 96 ) 263 87.6667
331 Mani ( 80 56 78 ) 214 71.3333
```

Result

Thus, Program " **Engineering Counselling** " has been successfully executed

Course:	Session: Abstract Class Virtual Function and Friend Function	Timestamp: 2021-4-1 10:44:42	Register Number:
OOPS			RA2031241010094

Q. Friends in Maths tutuion

Ajeesh and Diya are close friends.They two were going to the same maths tuition.One day diya and ajeesh had a doubt that is they able to automate the complex number operations.
They want to get four numbers.First two numbers for real and imaginary part.Similarly another two numbers for real and imaginary respectively.
They want the sum of the real and imaginary part as result.But they have some Mandatory restrictions in completing it.
Mandatory:
1.Create a class named "complex"
2.Create a friend function named "sum" with parameter as "obj"
3.Create a member function named "display" for the complex class with parameter as "obj".
4.Access the "display" member function from the main method using the object of the complex class.
Can you help they to complete the operation on complex numbers??
Refer Sample testcases.
Programming Language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class complex
{
  public:
  int a,b,c,d;
  friend void sum();
  void input()
  {
    cin>>a>>b>>c>>d;
  }
  void display()
  {
    cout<<a+c<<"+i"<<b+d;
  }
};
int main()
{
  complex obj;
  obj.input();
  obj.display();
 return 0;
}
```

Sample Input

```
5
10
6
19
```

Sample Output

```
11+i29
```

Result

Thus, Program " **Friends in Maths tutuion** " has been successfully executed

Course:	Session: Abstract Class Virtual Function and Friend Function	Timestamp: 2021-4-1 10:45:07	Register Number:
OOPS			RA2031241010094

Q. Shape and Measurements

Adarsh the Civil engineering student is interested in finding the perimeter of the rectangle.But he has only length and breadth of the rectangle and dont know hot to calculate the perimeter of the rectangle.
Can you help him ?
Mandatory:
1.Create a class named "Shape"
2.Create a virtual function named "getPerimeter" of type int.
virtual int getPerimeter() = 0;
3.Create a class Rectangle derived from class "Shape"
4.Invoke the virtual function getPerimeter from the rectangle class to calculate the perimeter of rectangle.
5.Display the result in the main method.
Refer sample testcases.
Programming language need to be used is :C++

Source Code

```
#include <iostream>
using namespace std;
class Shape
{
  public:
  virtual int getPerimeter()=0;
};
class Rectangle:public Shape
{
public:
int length,breadth;
void in()
{
cin>>length>>breadth;
}
int getPerimeter()
{
return (2*length)+(2*breadth);
}
};
int main()
{
  Rectangle obj;
  obj.in();
 cout<<"Perimeter of Rectangle is: "<<obj.getPerimeter();
 return 0;
}
```

Sample Input

```
5
8
```

Sample Output

```
Perimeter of Rectangle is: 26
```

Result

Thus, Program " **Shape and Measurements** " has been successfully executed

Course:	Session: Abstract Class Virtual Function and Friend Function	Timestamp: 2021-4-1 10:45:45	Register Number: RA2031241010094
OOPS			

Q. Polio

Central Medical Council has created the separate wing to educate people of the country about polio.
As per the order the group of central government employees has collected the data from the people of various states.
Now they want to present the overall picture of the survey to the central ministry.
So the are looking forward to automate the calculation of interdependency of states with respect to polio
Can you hep the officials to do that??
Mandatory:
1.Create a class "country"
2.Create a virtual function named "getdata" of type void.
3.Create a virtual function named "display" of type void.
4.Create a class "state" derived from class "country" and create the necessary member functions to get the details of state.
5.Invoke the getdata and display methods from the main method and display the result.
Refer Sample Testcases.
Programming Language need to be used:C++

Source Code

```
#include <iostream>
using namespace std;
class country
{
  public:
  virtual void getdata()=0;
  virtual void display()=0;
};
class state:public country
{
public:
char a[20];
int b,c;
char d[20];
int e,f;
void getdata()
{
cin>>a>>b>>c>>d>>e>>f;
}
void display()
{
cout<<"Country Name "<<a<<endl;
cout<<"Country Polio% "<<b<<endl;
cout<<"Country Litteracy%"<<c<<endl;
cout<<"The Measure of Interdependency "<<(float)b/c<<endl;
cout<<"State Name "<<d<<endl;
cout<<"%Age of Polio of State "<<e<<endl;
cout<<"%Age of Literacy of State "<<f<<endl;
cout<<"The Measure of Interdependency "<<(float)e/f<<endl;
}
};
int main()
{
  state s;
  s.getdata();
  s.display();
 return 0;
}
```

Sample Input

```
India
85
50
Tamilnadu
46
23
```

Sample Output

```
Country Name India
Country Polio% 85
Country Litteracy%50
The Measure of Interdependency 1.7
State Name Tamilnadu
%Age of Polio of State 46
%Age of Literacy of State 23
The Measure of Interdependency 2
```

Result

Thus, Program " **Polio** " has been successfully executed