1. I in C++ , There is a kind of class that it can only be inherited but cannot be initiated, we call that class as a (　　)，to define that kind of class, it has to have at least a　(　　)。
(A) virtual function　　(B) pure virtual function　　(C) abstract class　(D)friend class

2. Assume that AB is a class, the declaration of copy constructor of that class should be (　　)。
（A）AB&(AB x)　　(B)AB(AB x)　　(C)AB(AB &x)　　(D)AB(AB *x)

3. For the member of a structure, the default access modifier is (　　)。
(A) public;　(B) private;　(C) protected;　　(D) static;

4. Assume AB is a class, to execute statement "AB a(4),b[3],*p[2];", how many times to invoke the constructor?(　　)。
(A)　3　　(B) 4　　(C) 6　　(D) 9

5. Which of the following is not correct (　　)
(A) The name of constructor is same as the name of the class
(B) class constructor could have default parameters
(C) the default return type of a constructor is of type int
(D) the constructor can be overloaded

6. Parameterized stream manipulator ***setfill*** specifies the fill character that is displayed when an output is displayed in a field wider than the number of characters or digits in the output. The effect of ***setfill*** applies:
(A) Only to the current value being displayed.
(B) Only to outputs displayed in the current statement.
(C) Until explicitly set to a different setting.
(D) Until the output buffer is flushed.

7. Assuming the following is the beginning of the constructor definition for class Circle which inherits from class Point,
Circle::Circle( double r, int a, int b )
　: Point( a, b )
The second line:
(A) Invokes the `Point` constructor with values `a` and `b`.
(B) Causes a compiler error.
(C) Is unnecessary because the `Point` constructor is called automatically.
(D) Indicates inheritance.

8. Which of the following assignments would be a compilation error?
(A) Assigning the address of a base-class object to a base-class pointer.
(B) Assigning the address of a base-class object to a derived-class pointer.
(C) Assigning the address of a derived-class object to a base-class pointer.
(D) Assigning the address of a derived-class object to a derived-class pointer.

9. Assume class T is declared as following，which of the following declaration of the function fF() is not correct(　　)。

```
class T
{ int i;
   friend void fF(T&,int) ;
};
```

(A) void fF (T &objT,int k) { objT.i = k+1; }

(B) void fF (T &objT,int k) { k = objT.i+1; }

(C) void T::fF (T &objT,int k) { k += objT.i; }

(D) void fF (T &objT,int k) { objT.i += k; }

**Find out errors in the following code, and correct them.**

1）Following is the destructor function prototype in Time class definition：

*void ~Time( int );*

2）Following is part of the Time class definition：

```
class Time
{ public:
   private:
   int hour = 0;
   int minute = 0;
   int second = 0;
}; // end class Time
```

## Write the output of the following program.

1

```
#include <iostream>
using namespace std;
class test{
      private:
            int num;
            float fl;
public:
      test();
      int getint(){ return num;}
      float getfloat(){ return fl;}
      ~test();
};

test::test(){
      cout<<"Initailizing default"<<endl;
      num = 0;
      fl = 0.0;
}
```

```
test::~test(){
	cout<<"Destructor is active" <<endl;
}

int main(){
	test array[2];
	cout<<array[1].getint()<< "    " <<array[1].getfloat()<<endl;
}
```

2.

```
#include <iostream>
using namespace std;
class A {
public:
	A() { cout <<" A::A() called.\n";}
	virtual ~A() { cout<<"A::~A() called.\n";}
};
class B: public A{
public:
	B(int i){
		cout<<"B::B()called.\n";
		buf = new char[i];}
	virtual ~B() {
		delete [] buf;
		cout<< "B::~B() called.\n";
	}
private:
	char * buf;
};
void fun(A * a) {
	delete a;
}
void main() {
	A * a = new B(15);
	fun(a);
}
```

3.

```
	#include<iostream>
	using namespace std;
	class T {
	public:
```

```
        T(int x){ a=x; b*=x;};
        static void display(T c){
            cout<<"a="<<c.a<<'\t'<<"b="<<c.b<<endl; }
    private:
        int a;
        static int b;
    } ;
    int T::b=4;
    int main(){
        T A(3),B(2);
        T::display(A);
        T::display(B);
    }
```

4.

```
#include <iostream>
using namespace std;
class B
{   int b;
  public:
    B(int i) { b=i; }
    virtual void virfun() { cout<< "B::b: "<<b<<endl; }
};
class D: public B
{   int d;
public:
    D(int i,int j): B(i) { d=j; }
    void virfun() { B::virfun(); cout<<"D::d: "<<d<<endl; }
};
void fun(B *objp) { objp->virfun(); }
void main()
{ B *pd ;
  pd=new B(3) ;     fun(pd);
  pd=new D(5,7);    fun(pd);
}
```

5.

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

```
class Employee
{ public:
Employee(const long k ,const char*    str ){ number = k;strcpy_s(name,20,str); }
virtual ~Employee(){ name[0] = '\0';}
const char * getName() const{ return name;}
const long getNumber() const { return number;}
        virtual double earnings() const=0;
        virtual void print() const { cout <<number<<setw(16)<<name ;}
        Employee * next;

   protected:
        long number;
        char name[20];
};

class Manager : public Employee
{ public:
        Manager(const long k , const char * str, double salary):    Employee(k,str)
        { setMonthlySalary(salary);}
        ~Manager() { }
        void setMonthlySalary(double salary) { monthlySalary = salary;}
        virtual double earnings() const { return monthlySalary;}
        virtual void print() const { Employee::print(); cout<<setw(16)<<"Manager\n";}

   private:
       double monthlySalary ;
};

class HourlyWorker : public Employee
{ public:
        HourlyWorker(const long k , const char * str, double w=0.0, int h=0 ): Employee(k,str){
             setWage(w); setHours(h);}
        ~HourlyWorker(){}
        void setWage(double w) { wage = w ;}
        void setHours(int h)      { hours = h ;}
        virtual double earnings() const { return wage * hours ;}
        virtual void print() const { Employee::print();
        cout<<setw(16)<<"Hours    Worker\n"<<    "\t\twageperhour       "<<wage<<"       Hours
"<<hours;
        cout<<"      earned $"<<earnings()<<endl; }
   private:
       double wage;
       double hours;
```

```
};

class PieceWorker : public Employee
{ public:
        PieceWorker(const long k , const char * str, double wage =0.0, int quantity=0 ):Employee(k,str){
              setWage(wage); setQuantity(quantity);}
        ~PieceWorker() { }
        void setWage ( double wage ){ wagePerPiece = wage ;}
        void setQuantity ( int    q){ quantity = q ;}
        virtual double earnings() const { return wagePerPiece * quantity; }
        virtual void print() const { Employee::print();
        cout<<setw(16) << "Piece Worker\n" ;
        cout<<"\t\twagePerPiece    "<< wagePerPiece<<"    quantity    "<<quantity;
        cout<<"      eared $" << earnings() <<endl;}
   private:
        double wagePerPiece;
        int quantity;
};
void main()
{ Employee * employ[3] ;
   int i;
   employ[0] = new Manager( 10135, "ZhangSan", 1200 ) ;
   employ[1] = new HourlyWorker( 30712, "LiSi", 5, 260 ) ;
   employ[2] = new PieceWorker( 20382, "Wangwu", 0.5, 2850 ) ;
   cout << setiosflags(ios::fixed|ios::showpoint) << setprecision(2) ;
   for( i = 0; i <3; i ++ )
       employ[i] -> print() ;
   for( i = 0; i < 3; i ++ )
       cout <<setw(8)<< employ[i]->getName() << "    " <<setw(10)<< employ[i] -> earnings()
<< endl ;

}
```

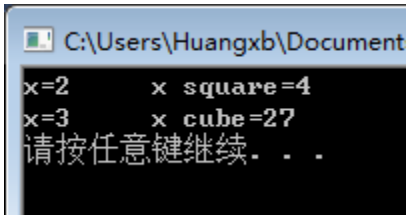
## fill in the blanks according to the output

1 . The following program defined a complex class stands for complex number. It has real part real and imaginary part img. It overloaded complex number addition by using friend function. Please finish it.

```
      class complex{
        float     [1],     [2];
        public:
```

```
  complex (float r=0,float i=0)
  {   real=r;   img=i;   }
  [3] [4] operator+(complex c1,complex c2);
};
[5] operator+(complex c1,complex c2)
  {   complex temp;
      [6]
      [7]
  return temp;
  }
```

2. The following code has the screen output below, please fill in the blanks.




```
#include <iostream>
#include <math>
using namespace std;
class Power
{   public:
        Power(int i){x=i;}
        ____(8)_____ void display(){ cout<<"x="<<x;}      // definition of virtual function
    protected:
        int x;
};
class Square: public Power
{   public:
      Square(int n):____(9)_________ { }    //Constructor of Square
      void display()
      {   _____（10）_____
       cout<<"\tx square="<<x*x<<endl;}
};
class Cube:public Power
{ public:
      Cube(int n):Power(n){ }
      void display()
       { _____（10）_____;
         cout<<"\tx cube="<<x*x*x<<endl;}
       };
void fun(Power &p)      {   p.display();}
```

```
void main()
{ Square squ(2);
   Cube cub(3);
   fun(squ);
   fun(cub);
}
```

## Write program

1．Use function template to calculate average of arrays of different data type. Function main () is as following:

```
#include <iostream>
using namespace std;
void main()
{     int a[]={ 1,2,3,4,5,6,7,8,9,10 };
      double b[]={ 1.1,2.2,3.3,4.4,5.5,6.6,7.7,8.8,9.9,10.0 };
      cout<< "Average of array a:" <<average(a,10)<<endl;
      cout<< "Average of array b:" <<average(b,10)<<endl;
}
```

Program calculates average of an array of type integer and of type double. complete a function template to accomplish such function(功能) (6 points )

2．

（1） Rewrite class Student, overload operator >> and << to substitute(代替) function input() and output() respectively. （8 points）

（2）Add a constructor for class Student to initiate data members ；（3 points）

（3）Modify function main() to get correct result. （3 points）

```
#include <iostream>
using namespace std;
class Student
{
      char name[20];
      unsigned id;
      double score;
   public:
      void input()
        {
            cout<<"name? ";
            cin>>name;
            cout<<"id? ";
            cin>>id;
            cout<<"score? ";
            cin>>score;
```

```
        }
    void output()
        {
            cout<<"name: "<<name<<"\tid: "<<id<<"\tscore: "<<score<<endl;
        }
};
int main()
{
    Student s;
    s.input();
    s.output();
}
```