C++作业五

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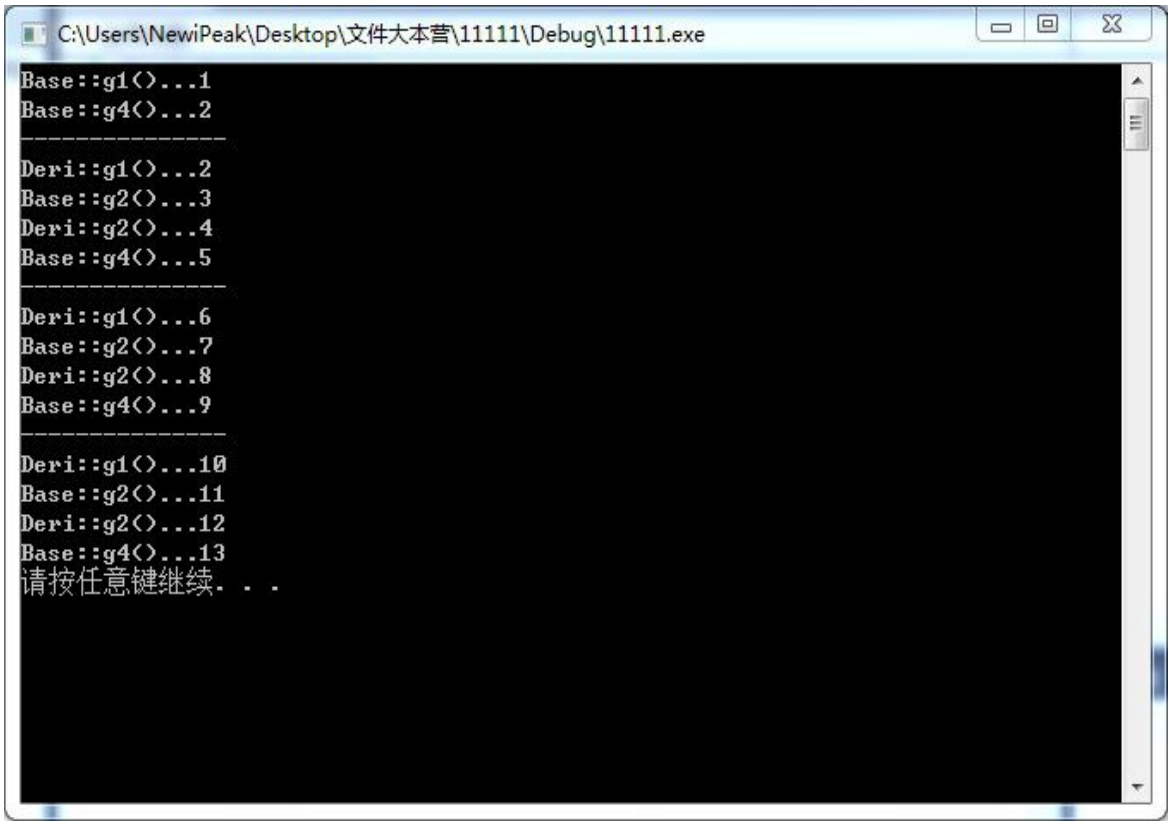
班级：12 级计算机科学与技术 1 班

一、读程序，写出程序运行的结果。

（1）

```
#include<iostream>
#include<stdlib.h>
using namespace std;
class Base{
protected:
    int n;
public:
    Base (int m){n=m++; }
    virtual void g1(){cout<<"Base::g1()..."<<n<<endl;g4();}
    virtual void g2(){cout<<"Base::g2()..."<<++n<<endl;g3();}
    virtual void g3(){cout<<"Base::g3()..."<<++n<<endl;g4();}
    virtual void g4(){cout<<"Base::g4()..."<<++n<<endl;}
};
class Derive:public Base{
    int j;
public:
    Derive(int n1,int n2):Base(n1){j=n2;}
    void g1(){cout<<"Deri::g1()..."<<++n<<endl;g2();}
    void g3(){cout<<"Deri::g2()..."<<++n<<endl;g4();}
};
void main(){
    Derive Dobj(1,0);
    Base Bobj=Dobj;
    Bobj.g1 ();
    cout<<"---------------"<<endl;
    Base *bp=&Dobj;
    bp->g1();
    cout<<"---------------"<<endl;
    Base &bobj2=Dobj;
    bobj2.g1();
    cout<<"---------------"<<endl;
    Dobj.g1();
    system("pause");
```

```
}
```

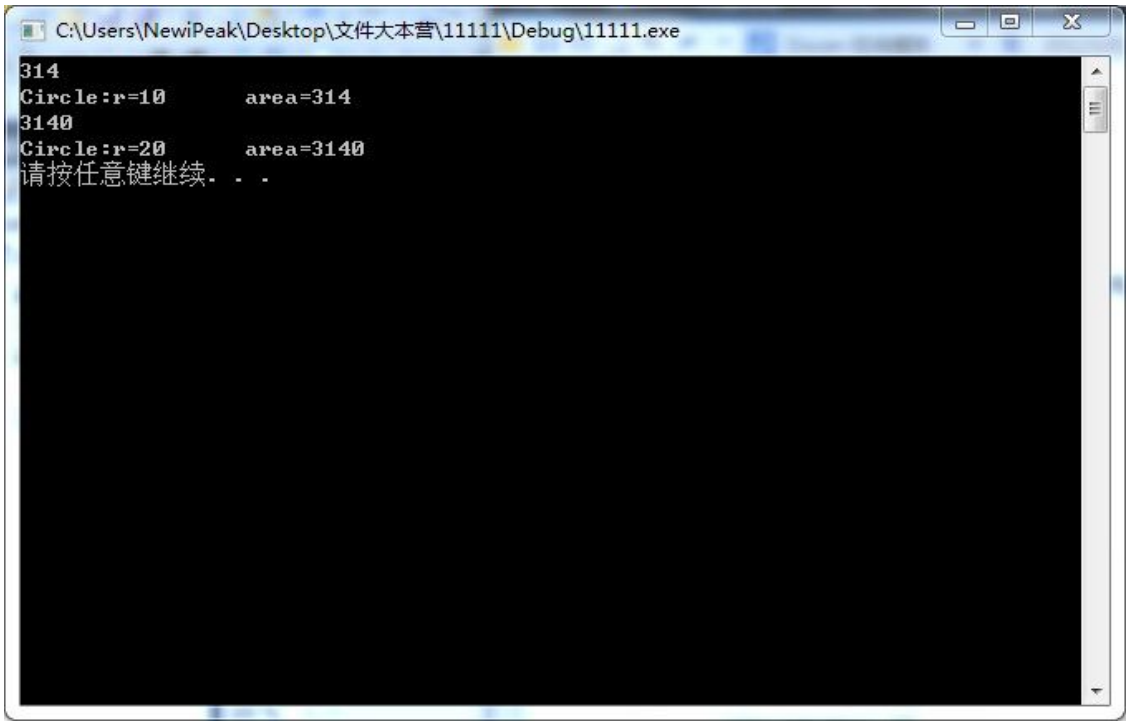


（2）

```
#include <iostream>
#include<stdlib.h>
using namespace std;
class Shape{
public:
    virtual double area(){return 0;}
    virtual void print()=0;
};
class Circle:public Shape{
protected:
    double r;
public:
    Circle(double x):r(x){}
    double area(){return 3.14*r*r;}
    void print(){cout<<"Circle:r="<<r<<"\t area="<<area()<<endl;}
};
class Cylinder:public Circle{
```

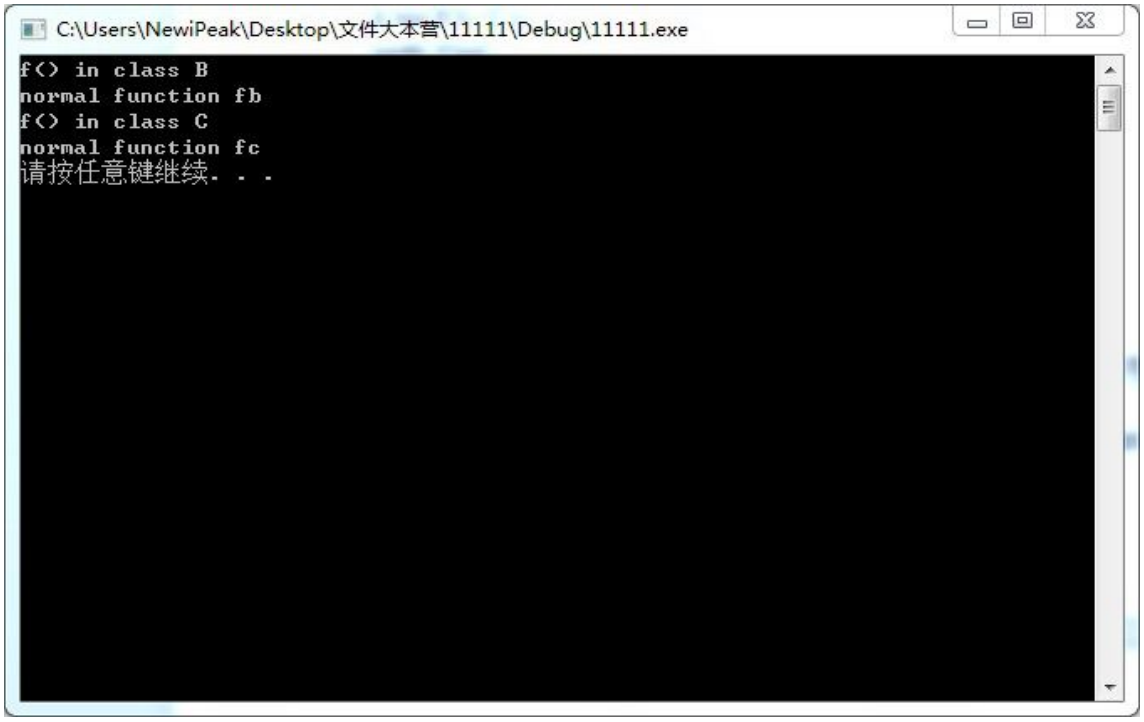
```
    double h;
public:
    Cylinder(double r,double x):Circle(r),h(x){}
    double area(){return 2*3.14*r*r+2*3.14*h;}
};
void shapeArea(Shape &s){cout<<s.area()<<endl;}
void shapePrint(Shape *p){p->print();}
void main(){
    Shape *s[3];
    s[0]=&Circle(10);
    s[1]=&Cylinder(20,100);
    for(int i=0;i<2;i++){
        shapeArea(*s[i]);
        shapePrint(s[i]);
    }
    system("pause");
}
```

注意：本例有意不在 Cylinder 类中重载纯虚函数 print()，因此需要仔细分析 shapePrint(s[1]) 的输出结论。



(3)

```
#include <iostream>
#include<stdlib.h>
using namespace std;
class A{
public:
void virtual f(){cout<<"f() in class A"<<endl;}
};
class B:public A{
public:
void f(){cout<<"f() in class B"<<endl;}
void fb(){cout<<"normal function fb\n";}
};
class C:public A{
public :
void f(){cout<<"f() in class C"<<endl;}
void fc(){cout<<"normal function fc "<<endl;}
};
void f(A* p){
p->f();
if(typeid(*p)==typeid(B)){
B* bp=dynamic_cast<B *>(p);
bp->fb();
}
if(typeid(*p)==typeid(C)){
C* bc=dynamic_cast<C *>(p);
bc->fc();
}
}
void main(){
A *pa;B b; C c;
pa=&b;f(pa);
pa=&c;f(pa);
    system("pause");
}
```

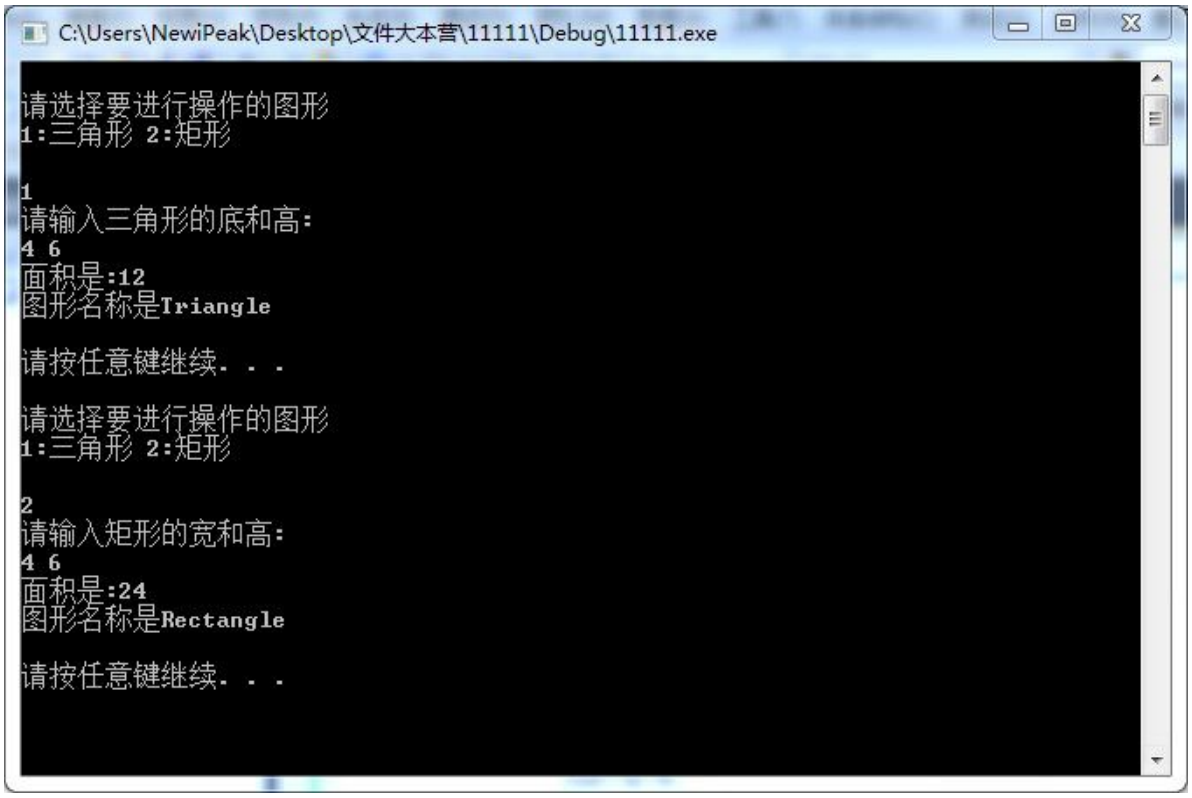


二、用抽象类设计计算二维平面图形面积的程序，在基类 TDshape 中设计纯虚函数 area()和 printname()，area()用于计算几何图形的面积，printname()打印输出几何图形的类名，如 Triangle 类的对象就打印输出定义 area()和 printname()的具体实现代码，如图 5-9 所示。要求编写 TDshape 为接口的函数，借以访问具体类如 Triangle 和 Rectangle 类的成员函数 Area(),printName().

```
#include<iostream>
#include<stdlib.h>
using namespace std;
class TDshape{
    public:
    void virtual area()=0;
    void virtual printName()=0;
 };
```

```
class Triangle:public TDshape{
    double width,height;
    public:
    void area()
    {
        cout<<"面积是:"<<width*height*0.5<<endl;
    }
    void printName()
    {
        cout<<"图形名称是Triangle"<<endl;
    }
    void setWidth(double a,double b)
    {
        width=a;height=b;
    }
    double getWidth()
    {
       return width;
    }
  };
class Rectangle:public TDshape{
                double width,height;
    public:
    void area()
    {
        cout<<"面积是:"<<width*height<<endl;
    }
    void printName()
    {
        cout<<"图形名称是Rectangle"<<endl;
    }
    void setHeight(double a,double b)
    {
        width=a;height=b;
    }
    double getHeight()
    {
       return width;
    }
  };
  void main()
  {
      do{
          double a,b;
```

```
        TDshape *TD;
        cout<<endl;
        cout<<"请选择要进行操作的图形"<<endl;
       cout<<"1:三角形 2:矩形"<<endl;
        cout<<endl;
       char op;
       cin>>op;
       switch(op)
        {
       case'1':
            {
                Triangle T;
               cout<<"请输入三角形的底和高:"<<endl;
               cin>>a>>b;
               T.setWidth(a,b);
               TD=&T;
               TD->area();
               TD->printName();
               break;
            }
       case'2':
            {
                Rectangle R;
               cout<<"请输入矩形的宽和高:"<<endl;
               cin>>a>>b;
               R.setHeight(a,b);
                TD=&R;
               TD->area();
               TD->printName();
               break;
           }
       }
        cout<<endl;
       system("pause");
    }while(true);
}
```


C:\Users\NewiPeak\Desktop\文件大本营\11111\Debug\11111.exe
请选择要进行操作的图形
1:三角形 2:矩形
1
请输入三角形的底和高:
4 6
面积是:12
图形名称是Triangle
请按任意键继续. . .
请选择要进行操作的图形
1:三角形 2:矩形
2
请输入矩形的宽和高:
4 6
面积是:24
图形名称是Rectangle
请按任意键继续. . .