OOP 23-24春夏 wk班期中

由CC98 马二马纯上 整理自群友提供的资源

第 I 段

判断题

1. Order of initialization in the initial list is the order of their declaration in the list. (T/F)

2. The output of the following C++ code is `6`. (T/F)

```
#include <iostream>
using namespace std;
class A {
public:
    int x;
    A(): x(6) {}
    int &fun(int &n) {
        x += n;
        return n;
    }
};
class B: public A {
public:
    B() {}
    int &fun(int &n, int &a) {
        x += n + a;
        return n;
    }
};
int main()
{
    B b;
    b.fun(b.x);
    cout << b.x;
}
```

3. For any class in C++, there must be a constructor without any argument. (T/F)

4. Destructors can not be overloaded. (T/F)

5. In C++, inheritance allows a derived class to directly access all of the functions and data of its base class. (T/F)

6. The following C++ code segment compiles but generates some runtime error. (T/F)

```
int main() { vector<float> v; v[0] = 2.5; }
```

7. In C++, `struct` is actually the same thing as `class` , except for minor differences in usage. (T/F)

8. Given the following C++ code segment:

```
class A {
    int i;
    virtual void f() {}
};
```

If `sizeof(int *) == sizeof(int) == 4` , then `sizeof(A) == 8` . (T/F)

单选题

2. What is the output of the following C++ program?

```
#include <iostream>
using namespace std;
int& f(int &i)
{
    i += 10;
    return i ;
}
int main()
{
    int k = 0;
    int& m = f(k);
    cout << k << "#";
    f(m)++;
    cout << k << endl;
    return 0;
}
```

A. `10#10`

B. `0#0`

C. None of the other options is correct.

D. `10#21`

5. Among the following statements about new and malloc , which one is correct?

A. `new` returns a `void *` pointer, which needs to be typecasted to the appropriate type.

B. Both `new` and `malloc` call an appropriate constructor for object allocation.

C. None of the other options is correct.

D. `new` and `malloc` are both operators.

10. Given:

```
class ResId {
public:
    ResId(int Id);
};
```

The expression `ResId res = 5` means:

A. An object of class Resld will be created by 5

B. A temporary object of class Resld will be created by 5

C. An object of class Resld will be created by a temporary object

D. The object res will be assiged with the temporary object that was created by 5

8. For an arbitrary class， the number of destructors can't be greater than

A. 2

B. 0

C. 3

D. 1

6. Suppose a class is defined without any keywords such as public, private and protected， all members default to

A. public

B. private

C. protected

D. static

1. Among the following 3 operators, how many ones can be overloaded?

- Operator1: `::`
- Operator2: `()`

- Operator3: `->`

A. 3

B. 0

C. 2

D. 1

11. In a C++ program, objects communicate each other by

A. inheritance

B. encapsulation

C. function overloading

D. calling member functions

7. Who can access a private member of a class?

A. Only member functions of that class and derived classes

B. Only member functions of that class.

C. Only member functions of that class and friend functions or member functions of friend classes

D. None of the others

9. Resolver `::` is used to:

A. Access a static member of a class

B. All of the others

C. Access a member of a namespace

D. Define a member function outside class declaration

4. For the code below:

```
class A {
    static int i;
    //...
};
```

Which statement is NOT true?

A. All objects of class A reserve a space for i

B. i is a member variable of class A

C. All objects of class A share the space of i

D. i is allocated in global data space

3. Which statement is correct about the following C++ code?

```
#include <iostream>
using namespace std;
class A {
public:
    int x;
    A(): x(6) {}
    int fun() {
        return x;
    }
};
class B: public A {
public:
    int fun() {
        return A::fun() + x;
    }
};
class C: public A {
public:
    int fun() {
        return A::fun() + x;
    }
};
class D: public B, public C {
public:
    int fun() {
        return B::fun() + C::fun();
    }
};
int main()
{
    D d;
    cout << d.fun();
}
```

A. It compiles but throws some exception, causing a run-time error.

B. It fails to compile due to the diamond inheritance and the ambiguity of `d.x` .

C. It compiles and gives the result `24` .

D. It fails to compile due to the lack of C'tors of class `B` , `C` and `D` .

12. Among the following statements about C++, which is correct?
A. All the static members of a class, both variables and functions included, need to be defined outside the class.

B. Objects of polymorphic class type which has non-virtual C'tor might cause undefined behavior.

C. The following C++ code segment leads some error when compiling since `another.x` is private.

```
class A {
    int x;
public:
    A(): x(0) {}
    int fun(A &another) {another.x += this->x;}
};
```

D. The `const` in the following C++ code segement imposes restriction on `this` .

```
class A {
public:
    int x;
    A(): x(0) {}
    int fun(int i) const {return x + i;}
};
```

输出填空题

1. What is the output of the following C++ program?

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

class A
{
public:
  A(int i) : mi(i) {}
  A(const A& rhs) : mi(rhs.mi)
  {
    cout << "A::A(&)" << endl;
  }
  A& operator=(const A&rhs)
  {
    mi = rhs.mi;
    cout << "A::operator=()" << endl;
    return *this;
  }
  virtual void f()
  {
    cout << "A::f(), " << mi << endl;
  }
protected:
  int mi;
};

class B : public A
{
public:
  B(int i, int j) : A(i), mj(j) {}
  void f()
  {
    cout << "B::f(), " << mi << ", " << mj << endl;
```

```
  }
private:
  int mj;
};

int main() {
  A a1(1);
  B b(3,4);

  A& ra = b;
  ra.f();
  ra = a1;
  ra.f();

  A a2 = b;
  a2.f();
}
```

Line 1: _____ (1分)

Line 2: _____ (1分)

Line 3: _____ (1分)

Line 4: _____ (1分)

Line 5: _____ (1分)

2. What is the output of the following C++ program?

```
#include <iostream>
using namespace std;
class MyClass {
public:
    MyClass(int x): val(x) {}
    void Print() const {cout << 1 << endl << val << endl;}
    void Print() {cout << 2 << endl << val << endl;}
private:
    int val;
};
int main()
{
    const MyClass obj1(10);
    MyClass obj2(20);
    obj1.Print();
    obj2.Print();
    return 0;
}
```

Line 1: _____ (1分)

Line 2: _____ (1分)

Line 3: _____ (1分)

Line 4: _____ (1分)

3. What is the output of the following C++ program?

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

class B;

class A {
protected:
    int x;
public:
    A(int x = 0): x(x) {}
    operator B();
    int getx() {return x;}
};

class B: public A {
public:
    B(int x = 0): A(x) {this->x++;}
    B(const B &b): A(b.x) {this->x++;}
};

A::operator B() {return *new B(x + 1);}

int main()
{
    A *p1 = new B(3);
    A *p2 = new A(9);
    B b0 = *p1;
    B &r = b0;
    B b1 = b0;
    B b2 = *p2;
    cout << p1->getx() << endl;
    cout << p2->getx() << endl;
    cout << b0.getx() << endl;
    cout << r.getx() << endl;
    cout << b1.getx() << endl;
    cout << b2.getx() << endl;
}
```

Line 1: _____ (1分)

Line 2: _____ (1分)

Line 3: _____ (1分)

Line 4: _____ (1分)

Line 5: _____ (1分)

Line 6: _____ (1分)

4. What is the output of the following C++ program?

```
#include <iostream>

struct X {
    X() {
        std::cout << "X::X()" << std::endl;
    }
    ~X() {
        std::cout << "X::~X()" << std::endl;
    }
};

struct Y : public X {
    Y() {
        std::cout << "Y::Y()" << std::endl;
    }
    ~Y() {
        std::cout << "Y::~Y()" << std::endl;
    }
};

struct Parent {
    Parent() {
        std::cout << "Parent::Parent()" << std::endl;
    }
    ~Parent() {
        std::cout << "Parent::~Parent()" << std::endl;
    }
    X x;
};

struct Child : public Parent {
    Child() {
        std::cout << "Child::Child()" << std::endl;
    }
    ~Child() {
        std::cout << "Child::~Child()" << std::endl;
    }
    Y y;
};

int main() {
    Child c;
}
```

Line 1: _____ (1分)

Line 2: _____ (1分)

Line 3: _____ (1分)

Line 4: _____ (1分)

Line 5: _____ (1分)

Line 6: _____ (1分)

Line 7: _____ (1分)

Line 8: _____ (1分)

Line 9: _____ (1分)

Line 10: _____ (1分)

程序填空题

1. The following C++ program outputs a string **ending with** `P1P3`**.** Please fill in the blanks in the code based on the given part of the output, and then write the output of the program.

```
#include <iostream>
using std::cout;
using std::endl;
class P
{
public:
    static bool flag;
    int x;
    P *left, *right;
    P(P* left=nullptr, P* right=nullptr)
    :x(0), left(left), right(right){}
    ~P()
    {
        if(flag)
        {
            if(left!=nullptr){ delete left; }
            if(right!=nullptr){ delete right; }
        }
        else
        {
            if(right!=nullptr){ delete right; }
            if(left!=nullptr){ delete left; }
        }
        cout<<"P"<<x;
    }
};
class S : public P
{
public:
    S(P* left=nullptr, P* right=nullptr)_______(2分){}
    ~S()
    {
        cout<<"S"<<x;
    }
};

________(2分)

int main()
{
    S* p1 = new S;
    ________(2分)
    S* p2 = new S;
```

```
    p2->x = 2;
    S s(p1, p2);
    ________(2分)
    return 0;
}
```

The output of the program is: (Please write the entire output, including the `P1P3` in the end of the output.) _____ (2分)

第II段

函数题1 Arrays of Pointers to Vectors

You are given an array of pointers to a specific type of elements, and the function `printArrayInfo` calculates and prints the minimum, maximum and average value (with 2 decimal places reserved) of the elements.

In this problem, the elements, which pointers in the array point to, are two-dimensional vectors, the components of which are integers. **The 2nd component of a two-dimensional vector is regarded as the order to compare, while the 1st component is the value to be casted to `double` for the calculation of the average value.**

To implement the two-dimensional vector, please complete the definition of class `vec` according to the `main` function, `printArrayInfo` function and the test cases.

Format of Class:

```
class vec;
```

Sample Program of Judge:

```
#include <iostream>
#include <iomanip>

#define MAXN 110

/* Your answer will be inserted here. Feel free to add anything needed here.*/

void printArrayInfo(vec **arr, int n)
{
    vec *maxv = arr[0], *minv = arr[0];
    double avg = 0;
    for(int i = 0; i < n; ++i) {
        vec *val = arr[i];
        if(*val < *minv) minv = val;
        if(*maxv < *val) maxv = val;
        avg = avg + static_cast<double>(*val);
    }
    avg /= n;
    std::cout << std::fixed << std::setprecision(2) <<  "min = " << *minv << ",
max = " << *maxv << ", avg = " << avg << std::endl;
```

```
}

int main()
{
    vec *pool[MAXN];
    int n;
    int a, b;
    std::cin >> n;
    for (int i = 0; i < n; i++) {
        std::cin >> a >> b;
        pool[i] = new vec(a, b);
    }
    printArrayInfo(pool, n);
    return 0;
}
```

Sample Input:

```
4
9 1
8 2
7 3
6 4
```

Sample Output:

```
min = (9,1), max = (6,4), avg = 7.50
```

函数题2 Virtual Function and Interface : Area of Shape

In C++, we usually use virtual function to declare interface for objects. This is because we can implement the interface with non-virtual function in the derived class.

For convenience, we use an example to demostrate the power of virtual function, the area of the shape.

Every 2-dimentional shape has its area, so if we represent a shape in computer, we must have the a method to evaluate the area of the shape. However, different shapes have different methods to calculate their area. We have already known the formular of the area of disk and rectangle. They are $S = \pi r^2$ and $S = ab$, respectively.

Now you need to write code of `class Shape` and `class Rect` according to `class Disk`.

Sample program of judge:

```
#include <iostream>
using std::cin;
using std::cout;
using std::endl;
using std::string;

/* Your code will be put here */
```

```
class Disk : public Shape
{
double r;
public :
    Disk(double r=0.):r(r){}
    ~Disk(){}
public :
    double area(){ return 3.14159*r*r; }
};
using Shape_ptr = Shape*; // pointer of Shape
int main()
{
    int n;
    string type;
    cin>>n;
    Shape_ptr shapes[n];
    for(int i=0;i<n;++i)
    {
        cin>>type;
        if(type=="disk")
        {
            double r;
            cin>>r;
            shapes[i] = new Disk(r);
        }
        else if(type=="rect")
        {
            double a, b;
            cin>>a>>b;
            shapes[i] = new Rect(a, b);
        }
    }
    for(int i=0;i<n;++i)
    {
        Shape_ptr shape = shapes[i];
        cout<<shape->area()<<" ";
        delete shape;
    }
    cout<<endl;

    return 0;
}
```

Sample Input:

```
3
disk 3
rect 2 5
rect 4.2 2
```

Sample Output:

```
28.2743 10 8.4
```

编程题1 字符串排序--string类的使用

先输入你要输入的字符串的个数。然后换行输入该组字符串。每个字符串以回车结束，每个字符串不多于一百个字符。

如果在输入过程中输入的一个字符串为“stop”，也结束输入。

然后将这输入的该组字符串按每个字符串的长度，由小到大排序，按排序结果输出字符串。如果存在多个字符串长度相同，则按照原始输入顺序输出。

输入格式:

字符串的个数，以及该组字符串。每个字符串以‘\n’结束。如果输入字符串为“stop”，也结束输入.

输出格式:

可能有多组测试数据，对于每组数据，将输入的所有字符串按长度由小到大排序输出(如果有“stop”，不输出“stop”)。

输入样例:

```
4
faeruhyytrjh tjytj
hsrthts   hjnshtgfhs
stop
3
htrskbns
bsartanjsf tyjndyt
nsr jj jtey
```

输出案例:

```
faeruhyytrjh tjytj
hsrthts   hjnshtgfhs
htrskbns
nsr jj jtey
bsartanjsf tyjndyt
```

提示:根据输入的字符串个数来动态分配存储空间（采用new()函数）。每个字符串会少于100个字符。测试数据有多组，注意使用while()循环输入。

来源:数据结构高分笔记

编程题2 类、Map

求和Map：计并实现一个MyMap类，要求至少含有以下两种方法

一、**insert**方法：将一对（字符串，整数）的键值建立映射，若键已存在，则进行覆盖。

二、**sum**方法：输入一个前缀字符串，输出以该前缀开头的键值总和

输入格式:

第一行输入一个N，表示接下来要操作的数量

随后N行表示操作：

insert方法后跟字符串与整数，通过空格隔开

sum方法后跟字符串，通过空格隔开

说明：假设不包含其他无效输入

输出样例：

输出以该前缀开头的键值总和，若无，则输出0

输入样例:

```
3
insert china 5
insert canada 3
sum c
```

输出样例:

```
8
```

答案

判断题

FFFTF TTT

单选题

DC?DB CDCBA CD

单选题第3题答案不能确定