

OOP 23-24春夏

CC98 马二马纯上

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单选题

1. Copy constructor is a constructor which _____
 - A. Creates an object by copying values from another object of another class
 - B. Creates an object by copying values from any other object of same class
 - C. Creates an object by initializing it with another previously created object of same class
 - D. Creates an object by copying values from first object created for that class

2. In multi-level inheritance(all public), the public members of parent/superclass will _____
 - A. Will continue to get inherited subsequently
 - B. Will not be available to be called outside class
 - C. Will not be inherited after one subclass inheritance
 - D. Will not be able to allocated with any memory space

3. Which code below fails compilation?
 - A.

```
struct U {};  
struct V : public U {};  
struct W : public U {};  
int main()  
{  
    U * p = new V;  
    W * q = static_cast<W*>(p);  
    return q == nullptr;  
}
```

B.

```

struct U { virtual void foo() {} };
struct V : public U {};
struct W {};
int main()
{
    U * p = new V;
    W * q = dynamic_cast<W*>(p);
    return q == nullptr;
}

```

C.

```

struct U { virtual void foo() {} };
struct V : public U {};
struct W : public U {};
int main()
{
    U * p = new V;
    W * q = dynamic_cast<W*>(p);
    return q == nullptr;
}

```

D.

```

struct U {};
struct V : public U {};
struct W {};
int main()
{
    U * p = new V;
    W * q = static_cast<W*>(p);
    return q == nullptr;
}

```

4. If programmer have defined parameterized constructor only, then _____

- A. Default constructor will not be created by the compiler implicitly
- B. Default constructor will not be created but called at runtime
- C. Default constructor will be created by the compiler implicitly
- D. Compile time error

5. Which of the following operator cannot be used to overload when that function is declared as friend function?

- A. `[]`
- B. `==`
- C. `--`

D. []

6. If a class have default constructor defined in private access, and one parameter constructor in protected mode, how will it be possible to create instance of object?

- A. Directly create the object in the subclass
- B. Define a constructor in public access with different signature
- C. Directly create the object in main() function
- D. Not possible

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7. Which programming paradigm below is not well supported in C++?

- A. Object-oriented programming
- B. Procedural programming
- C. Declarative programming
- D. Generic programming

8. Which statement below is not a requirement for an object-oriented programming language?

- A. Objects have an associated type [class].
- B. Types [classes] may inherit attributes from supertypes [superclasses].
- C. It uses algorithms as its fundamental logical building blocks.
- D. It supports objects that are data abstractions with an interface of named operations and a hidden local state.

9. Which among the following is multiple inheritance?

A.

```
class student { };  
class stream { };  
class topper { };
```

B.

```

class student {
public:
    int marks;
} s;
class stream {
    int total;
};
class topper : public student, public stream { };

```

C.

```

class student {
    int marks;
};
class stream { };
class topper : public student { };

```

D.

```

class student {
    int marks;
};
class stream : public student { };

```

10. How many times is the destructor of class A called during execution?

```

#include <iostream>
using namespace std;

class A {
public:
    A() { cout << "A()" << endl; }
    ~A() { cout << "~A()" << endl; }
};

void foo(A a) {
    A arr[5];
    A *p = new A[3];
    throw p;
}

int main()
{
    try {
        A a;
        foo(a);
    } catch (A *p) {
        delete[] p;
        cout << "catched" << endl;
    }
}

```

- A. 5
- B. 7
- C. 10
- D. 3

结果填空题

1.

```
#include <iostream.h>
#include <string.h>
#include <cstdlib.h>
using namespace std;

void func(int a, int b)
{
    if (b < 1) {
        throw b;
    }
    else {
        cout << "Product of " << a << " and " << b << " is: " << a*b << endl;
    }
}

int main()
{
    try
    {
        try
        {
            func(5,-1);
        }
        catch (int b)
        {
            if (b==0)
                throw "value of b is zero\n";
            else
                throw "value of b is less than zero\n";
        }
    }
    catch (const char* e)
    {
        cout << e;
    }
}
```

Line 1: _____ (3分)

2. The output of the code below is:

```
#include <iostream>
using namespace std;
class AnyError
{
public:
    AnyError() { }
};
class RangeError :public AnyError
{
public:
    RangeError(int ID) { m_ID = ID; }
    void print() { cout << "ID:" << m_ID << endl; }
protected:
    int m_ID;
};
void FuncA(int ID)
{
    if (ID > 8)
        throw RangeError(ID);
    cout << "FuncA" << endl;
}
void FuncB()
{
    try
    {
        FuncA(4);
        FuncA(10);
    }
    catch (RangeError& re)
    {
        cout << "FuncB" << endl;
        re.print();
        throw AnyError();
    }
}
int main()
{
    try {
        FuncB();
    }
    catch (...)
    {
        cout << "Main" << endl;
    }
    return 0;
}
```

- The first line is: _____ (1分)
- The second line is: _____ (1分)
- The third line is: _____ (1分)

- The fourth line is: _____ (1分)

3.

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

template <class T>
class A {

public:
    A() { }
    void print() const
    {
        cout << "A<T>" << endl;
    }
};

template <>
class A<double> {
    double a1, a2, a3;
public:
    A()
    {}
    void print() const
    {
        cout << "A<double>" << endl;
        return;
    }
};

template <>
class A<int> {
    double a1, a2, a3;
public:
    A()
    {}
    void print() const
    {
        cout << "A<int>" << endl;
        return;
    }
};

int main()
{
    A<double> t1;
    A<char> t2;
    A<int> t3;
    t1.print();
    t2.print();
    t3.print();
}
```

The output of this program should be:

Line 1: _____ (1分)

Line 2: _____ (1分)

Line 3: _____ (1分)

4. What is the output of the following code?

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

class WeirdString
{
public:
    weirdString() = default;
    weirdString& operator++() {
        s += "Hey";
        return *this;
    }
    weirdString operator++(int) {
        weirdString old = *this;
        s += "Ho";
        return old;
    }
    weirdString& operator+=(const weirdString& rhs) {
        s += ("Ha" + rhs.str());
        return *this;
    }
    string str() const { return s; }
private:
    string s;
};

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int main()
{
    weirdString w;
    weirdString t = w++;
    ++(w += (t++));
    cout << w.str() << endl;
}
```

Line 1: _____ (3分)

5.

Content of header file `h1.h`


```
// h1.h
#include <iostream.h>
using namespace std;
namespace A {
    int func(int a) {
        cout << "using namespace A";
        return 2*a;
    }
}
```

Content of header file `h2.h`

```
// h2.h
#include <iostream.h>
using namespace std;
namespace B {
    float func(float a) {
        cout << "using namespace B";
        return 2*a;
    }
}
```

Content of `program.cpp`

```
#include <iostream.h>
#include <string.h>
#include "h1.h"
#include "h2.h"

using namespace std;
using namespace A;
using namespace B;

int main(int argc, char const *argv[]) {
    /* code */
    int a = 10;
    float b = 10.0;
    cout << func(a) << endl;
    cout << func(b);
    return 0;
}
```

Line 1: _____ (2分)

Line 2: _____ (2分)

6. What will be the output of the following code?

```
#define __MaErMaChunShang_CC98__
#include <iostream>
using namespace std;
class C1
```

```

{
public:
    C1() {
        cout << "$C1()$";
    }
    C1(const C1& a) {
        cout << "$C1(const C1&)$";
    }
    virtual ~C1() {
        cout << "$~C1()$";
    }
};

class C2 : public C1
{
public:
    C2() {
        cout << "$C2()$";
    }
    ~C2() {
        cout << "$~C2()$";
    }
};

int main()
{
    C2* pc2 = new C2();
    cout << endl;
    {
        C1 a = *pc2;
        cout << endl;
    }
    C1* pc1 = pc2;
    delete pc1;
    cout << endl;
}

```

The output is:

Line 1: _____ (1分)

Line 2: _____ (1分)

Line 3: _____ (1分)

程序填空题

1. Array is a template that implements a dynamically expandable array. `next` is used to link to the next block of the array. Fill in the blanks to complete the code.

```

#include <iostream>
using namespace std;

```

```

template <typename T>
class Array {
public:
    Array() {
        data = new T[BLK_SIZE];
        next = _____(1分) ;
    }
    ~Array() {
        delete [] data;
        delete next;
    }
    T& operator[](int i);
    void iterate(void (*f)(T&));
private:
    _____(2分) *data; // data of type T
    static const int BLK_SIZE=32; // fixed block size
    _____(1分) *next; // the next array block
};

template <typename T>
T& _____(1分) operator[](int i) {
    if (i < BLK_SIZE) {
        return _____(2分);
    } else {
        if (next == NULL) {
            next = new _____(2分);
        }
        return (*next)[i-BLK_SIZE];
    }
}

template <typename T>
void _____(2分) iterate(void (*f)(T&)) {
    for (int i = 0; i < BLK_SIZE; i++) {
        f(data[i]);
    }
    if (next != NULL) {
        next-> _____(2分);
    }
}

int main()
{
    Array _____(2分) a;
    int size = 100;
    cin >> size;
    for (int i = 0; i < size; i++) {
        a[i] = i;
    }
    a.iterate([](int &x) { cout << x << endl; });
}

```

2. The function `inner_product` computes the inner product (i.e., sum of products) between the elements in the range `[first1, last1)` and those in the same size range beginning at `first2`. Please fill in the blanks of the following code to finish the implementation.

The code to complete:

```
#include <functional>
#include <iostream>
#include <vector>

_____(1分) <class InputIt1, class InputIt2, class T, class BinaryOp1, class
BinaryOp2>
T inner_product(InputIt1 first1, InputIt1 last1, InputIt2 first2, T init,
_____(3分) op1, _____(3分) op2)
{
    while (first1 != last1)
    {
        init = _____(3分) (init, op2( _____(3分) ));
        ++first1;
        _____(2分) ;
    }
    return init;
}

int main()
{
    std::vector<int> a{0, 1, 2, 3, 4};
    std::vector<int> b{5, 4, 2, 3, 1};
    int r1 = inner_product(a.begin(), a.end(), b.begin(), 0, std::plus<>(),
std::multiplies<>());
    std::cout << "Inner product of a and b: " << r1 << '\n';

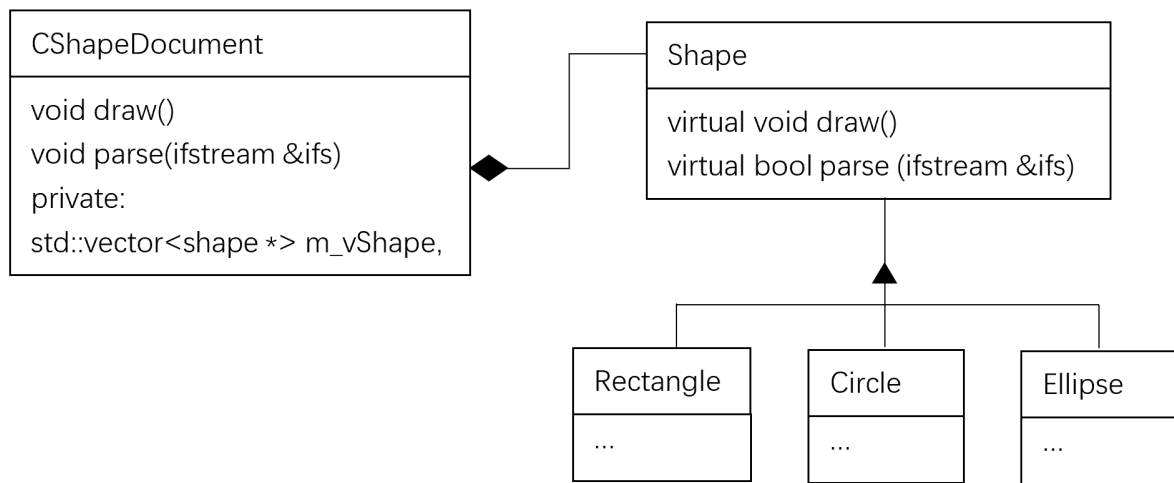
    int r2 = inner_product(a.begin(), a.end(), b.begin(), 0, std::plus<>(),
std::equal_to<>());
    std::cout << "Number of pairwise matches between a and b: " << r2 << '\n';
}
```

Required output:

```
Inner product of a and b: 21
Number of pairwise matches between a and b: 2
```

主观题

The class hierarchy in this program design task is as follows:



Note that the shapes are contained in the `CShapeDocument`, and they are read from the file using its member function `parse(ifstream &ifs)`. The text stored in the file to describe the shapes in the document are as follows:

```

Rectangle left-bottom 1.0 1.0 w&H 10.0 20.0
Circle center 10.0 10 radius 5.0
Ellipse center 9.0 9.0 radius 10.0 30.0
  
```

The first string is the type of the shape and the rest texts describe its attributes. Specifically, left-bottom means 1 and 1 are the 2D coordinate of the rectangle, and W&H means 10 and 20 are the width and height of the rectangle. The descriptions of the circle and ellipse are similar.

Suppose the following texts are stored in the `D:\shapes.txt`:

```

Rectangle left-bottom 20.0 50.0 w&H 20.0 40.0
Circle center 8.0 8.0 radius 7.0
Ellipse center 5.0 5.0 radius 10.0 2.0
  
```

Please read the implementation of `CShapeDocument` and `main` function and implement the required shape classes, such as `Rectangle`, `Ellipse` and `Circle` such that the shapes are analyzed from the file `D:\shapes.txt` and stored in an object of the class `CShapeDocument`.

```

#include <iostream>
#include <fstream>
#include <vector>
using namespace std;

class shape
{
public:
    virtual ~shape() {}

    virtual void draw() = 0;
    virtual bool parseattribute(ifstream &ifs) = 0;
};

class Rectangle : public shape
{
    ...
  
```

```

};

class Circle : public shape
{
...
};

class Ellipse : public shape
{
...
};

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class CShapeDocument
{
public:
    CShapeDocument() {}
    ~CShapeDocument();
public:
    void draw();
    void parse(ifstream& ifs);
private:
    std::vector<shape*> m_vShape;
};

CShapeDocument::~~CShapeDocument()
{
    std::vector<shape*>::iterator itShape;

    for (itShape = m_vShape.begin(); itShape != m_vShape.end(); itShape++)
        delete* itShape;
}

void CShapeDocument::draw()
{
    std::vector<shape*>::iterator itShape;

    for (itShape = m_vShape.begin(); itShape != m_vShape.end(); itShape++)
        (*itShape)->draw();
}

template<class X>
void parseattribute(ifstream& ifs, std::vector<shape*> &vShape)
{
    shape* pX = new X();
    if (!pX->parseattribute(ifs))
    {
        delete pX;
        return;
    }
    vShape.push_back(pX);
}

void CShapeDocument::parse(ifstream &ifs)
{
    std::string str;

```

```

while(1)
{
    str = "";
    ifs >> str;
    if (str == "Rectangle")
        parseattribute<Rectangle>(ifs, m_vShape);
    else if (str == "Circle")
        parseattribute<Circle>(ifs, m_vShape);
    else if (str == "Ellipse")
        parseattribute<Ellipse>(ifs, m_vShape);
    else
        break;
}

}

int main()
{
    std::ifstream ifs("D:\\shape.txt");
    CShapeDocument shapedoc;
    shapedoc.parse(ifs);
    shapedoc.draw();
}

```

And the output of the program is as follows:

```

Rectangle 20 50 w&H 20 40
Circle 8 8 radius 7
Ellipse 5 5 radius 10 2

```

单选题答案

CADAD BCCBC

注：单选第3题答案不能确定，待考

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