

I .Single Choice (24 points)

- 1、Which of following translates a program written in a high-level language into machine code?
- A. a mouse
  - B. a compiler
  - C. an operating system
  - D. an editor
- 2、One of the following statements does not show a proper use of the *sqrt* library function. Which one is the wrong statement? (Assume all variables are *float* variables.)
- A. `y = sqrt(x);`
  - B. `y = 3.85 * sqrt(x + 4.2);`
  - C. `cout << sqrt(x);`
  - D. `sqrt(25.0*x);`
- 3、Which of the following statements sends a newline character to the standard output device?
- A. `cout << endl;`
  - B. `cout << '\n';`
  - C. `cout << \n;`
  - D. a and b above
- 4、If the int variables i, j, and k contain the values 10, 3, and 20, respectively, what is the value of the following logical expression: `j < 4 || j == 5 && i <= k`
- A. 3
  - B. false
  - C. true
  - D. 20
- 5、In C++, a function prototype is
- A. a declaration but not a definition.
  - B. a definition but not a declaration.
  - C. both a declaration and a definition.
  - D. neither a declaration nor a definition.
- 6、Given the declarations
- ```
enum MovieRatings {G, PG, PG13, R, X};  
MovieRatings thisOne;
```
- and assuming that thisOne currently contains a value less than X, which of the following statements can be used to "increment" thisOne?
- A. `thisOne = thisOne + 1;`
  - B. `thisOne++;`
  - C. `thisOne = MovieRatings(thisOne + 1);`
  - D. `MovieRatings(thisOne++);`
- 7、If a C++ class declaration begins as
- ```
class A : public B  
{
```
- then which of the following is true?
- A. Public members of B become public members of A.
  - B. Public members of B become private members of A.
  - C. Public members of A become public members of B.
  - D. Public members of A become private members of B.
- 8、If the following function is called with a value of 3 for n, what is the resulting output?
- ```
void TapDance( /* in */ int n )  
{    if (n > -1)  
    {        TapDance(n - 1);  
        cout << "Flap";  
    }  
    else  
        cout << "Shuffle";  
}
```
- A. FlapFlapFlapFlapShuffle
  - B. ShuffleFlapFlapFlapFlap
  - C. ShuffleFlapFlap
  - D. FlapFlapShuffle

II .What is the output of the following C++ program? (40 points)

1、 What is the output of the following program? (5 points)

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

int main(void) {
    double x = 7 / 3.0;
    double y = 7 / 3;
    double z = 7 % 3;

    cout<<showpoint<<fixed<<setprecision(3);
    cout << "x = " << x << " ";
    cout.width(5);
    cout << "y = " << y << " ";
    cout << "z = " << z << " " << endl;
    return 0;
}
```

2、 What is the output of the following program? (5 points)

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

int main()
{
    int a=6;
    a++;
    cout << "The number is: ";
    switch(a%2)
    {
        case 1:
            cout << "one ";
        case 2:
            cout << "two ";
        case 3:
            cout << "three ";
        case 4:
            cout << "four ";
```

```
        break;
    case 5:
        cout << "five ";
    default:
        cout << "?";
    }
    cout << endl;
    return 0;
}
```

3、 What is the output of the following program? (8 points)

```
#include <iostream.h>
void Swap( int &a, int & b );
int main()
{
    int x( 10 ), y( 7 );
    cout<<"x="<<x<<"  y="<<y<<endl;
    Swap( x , y );
    cout<<"x="<<x<<"  y="<<y<<endl;
}
```

```
void Swap(int & a, int & b)
{
    int temp;
    temp = a ;
    a=b ;
    b=temp ;
}
```

4、 What is the output of the following program? (5 points)

```
#include <iostream.h>
using namespace std;
void SubProg();
```

```
int main()
{
    int i;
    for(i=0;i<3;i++)
    {
        SubProg();
    }
    return 0;
}
void SubProg()
{
    int i=0;
    static int j=0;

    i++;
    j++;
    cout<<i<<' '<<j<<endl;
}
```

5、 What is the output of the following program? (5 points)

```
#include <iostream>
using namespace std;
int main(){
    char cstr1[] = { "Hello"};
    char cstr2[] = { "C-+"};
    char * pCstr2 = cstr2;
    cout << cstr1 << ',' << cstr1[1] << ',' << *(cstr1+4) << ',';
    cout << *pCstr2; pCstr2 += 2;
    cout << *pCstr2 << pCstr2 - cstr2;
    return 0;
}
```

6、 What is the output of the following program? (6points)

```
#include <iostream>
using namespace std;
class B{
public:
    virtual void show() {cout<<"B";}
};
class D:public B{
public:
    void show() {cout<<"D"; }
};
void fun1(B &ptr)
{
    ptr.show();
}
void fun2(B ptr2)
{
    ptr2.show();
}
int main()
{   B b;
    D d;
    fun1(b);
    fun1(d);
    fun2(b);
    fun2(d);
    return 0;
}
```

7、 What is the output of the following program? (6 points)

```
#include <iostream>
using namespace std;
int main()
{
    int a[3][4]={1,2,3,4,5,6,7,8,9,10,11,12};
    cout<<a[0][1]<<endl;
    cout<<*(a[1]+1)<<endl;
    cout<<*(*(a+2)+1)<<endl;
    return 0;
}
```

8、What is the output of the following program? (6 points)

```
#include <iostream>
using namespace std;
int main()
{
    int a[100],b[100],j,m;
    int sumA=0,sumB=0,sumDiff=0;
    cin>>m;
    for(j=0;j<m;j++)
    {
        cin>>a[j]>>b[j];
        sumA=sumA+a[j];
        sumB=sumB+b[j];
        sumDiff=sumDiff+(a[j]-b[j]);
    }
    for(j=m-1;j>=0;j--)
    {
        cout<<a[j]<<' '<<b[j]<<' '<<a[j] - b[j] <<endl;
    }
    cout<<endl;
    cout<<sumA<<' '<<sumB<<' '<<sumDiff<<endl;
    return 0;
}
```

Input data:

3

11 15

19 14

4 2

III.Fill the vacant position in the program? (10 points)

The following program is a recursion, which is called the Towers of Hanoi. Please fill the vacant of the program.

```
#include <iostream>
#include <__1__>

using namespace __2__ ;

void __3__(int ,int ,int ,int);
```

```
int main()
{
    int circleCount;
    cout<<"Input number of circles:";
    cin>>circleCount;
    DoTowers(circleCount,1,2,3);
    return 0;
}

void DoTowers(int circleCount,int beginPeg,int auxPeg,int endPeg)
{
    //This recursive function moves circleCount circles from beginPeg to endPge.
    //all but one of the circles are moved from beginPeg to auxPeg,
    //then the last circle is moved from beginPeg to endPeg,
    //and then the circles are moved from auxPeg to endPeg.

    if( __4__ )
    {
        DoTowers( __5__ , beginPeg, __6__ , __7__ );
        cout<<setw(10)<<"Move circle"<<circleCount<<" from "<<beginPeg
            <<" to "<<endPeg<<endl;
        DoTowers( __8__ , auxPeg, __9__ , __10__ );
    }
}
```

#### IV. Programming Problems (26 points)

1. Write a function `comb(int n, int k)`, implement the formula  $C(n,k) = \frac{n!}{k!(n-k)!}$ . (8 points)

#### 2. Find (8 points)

Everyone who has used OFFICE software would be familiar with the "find" function. To simplify the problem, your task is to calculate the occurring time of a key word in a sentence.

##### **Input:**

There are several test cases in the input data. The first line contains the number of test cases. For each test case, there are two lines. The first line contains a sentence without any spaces in it. The second line contains the key word. All the input sentences or words consist of lowercase letters.

##### **Output:**

You should output the occurring time of the key word in the sentence.

##### **Sample Input:**

```
3
aaaa
aa
xxyyzz
xyz
goodluck
```

0

##### **Sample Output:**

```
3
0
2
```

#### 3. Binary (10 points)

Binary system plays a crucial role in computer science. Given an integer  $n$ , we can easily write it in the binary form which is a 0-1 sequence. Your task is to calculate the number which is represented by that sequence in reverse order. For instance, the binary form of integer 6 is  $(110)_2$ , so the answer is 3 with the binary form  $(011)_2$ .

##### **Input:**

There are several test cases in the input data. The first line contains the number of test cases. For each case, there is an integer  $n$  in a separate line. ( $1 \leq n \leq 10^5$ )

##### **Output:**

Output the number which is represented by that sequence in reverse order.

##### **Sample Input:**

```
5
10
100
1000
10000
100000
```

##### **Sample Output:**

```
5
19
95
569
2755
```

**I .Answer:**

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| B | D | D | C | A | C | A | B |

**II .Answer:**

|                               |                                                 |
|-------------------------------|-------------------------------------------------|
| 1、<br>x=2.333 y=2.000 z=1.000 | 2、<br>The number is: one two three four         |
| 3、<br>x=10 y=7<br>x=7 y=10    | 4、<br>1 1<br>1 2<br>1 3                         |
| 5、 2<br>2<br>4<br>4<br>5      | 6、<br>BDBB                                      |
| 7、<br>2<br>6<br>10            | 8、 4 2 2<br>19 14 15<br>11 15 -4<br><br>34 31 3 |

**III. Answer:**

- (1) iomanip                          (2) std  
 (3) DoTower                          (4) circleCount>0  
 (5) circleCount-1                    (6) endPag  
 (7) auxPag                            (8) circleCount-1  
 (9) beginPag                        (10) endPag

**1. Example:**

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

long fact(int n)

{
    if (n < 2)    return 1;
    long f = 1;
    for (int i=2; i<=n; i++)
        f=f*i;
    return f;
}

long comb(int n, int k)

{
    if (n<0 || k<0 || k>n) return 0;
    return fact(n)/(fact(k)*fact(n-k));
}

int main()

{
    int n,k;
    cin >>n >>k;
    cout << comb(n,k)<<endl;
    return 0;
}
```

## 2. Example:

```
#include <iostream>
#include <string>
using namespace std;
int main()
{
    string str, sstr;
    int cases,i;
    cin >> cases;
    for (i=0; i<cases; i++)
    {
        cin >> str >> sstr;
        int count = 0;
        int loc = 0;
        while (loc < str.length())
        {
            loc = str.find(sstr, loc);
            if ( loc == string::npos)
                break;
            else
            {
                count++;
                loc++;
            }
        }
        cout<<count<<endl;
    }
    return 0;
}
```

## 3. Example:

```
#include <iostream>
using namespace std;
int main()
{
    int cases,i,j,k,l,a,b;
    int arr[20];
    cin >> cases;
    for (i=0; i<cases; i++)
    {
        cin >> a;
        j = 0;
        while (a > 1)
        {
            if (a%2 == 0)
                arr[j] = 0;
            else
                arr[j] = 1;
            a=a/2;
            j++;
        }
        if (a==1)
            arr[j] = 1;
        else
            j--;
        k = 0;
        b = 0;
        for(l=j; l>=0; l--)
        {
            b = b + (arr[l] << k);
            k++;
        }
        cout << b << endl;
    }
    //system("pause");
    return 0;
}
```