第一章

1.5 题

```
#include <iostream>
using namespace std;
int main()
{
  cout<<"This"<<"is";
  cout<<"a"<<"C++";
  cout<<"program.";
  return 0;
```

1.6 题

```
#include <iostream>
using namespace std;
int main()
{
  int a,b,c;
  a=10;
  b=23;
  c=a+b;
  cout<<"a+b=";
  cout<<c;
  cout<<endl;
```

```
  return 0;
}
```

1.7 七题

```
#include <iostream>
using namespace std;
int main()
{
  int a,b,c;
  int f(int x,int y,int z);
  cin>>a>>b>>c;
  c=f(a,b,c);
  cout<<c<<endl;
  return 0;
}
int f(int x,int y,int z)
{
  int m;
  if (x<y) m=x;
     else m=y;
  if (z<m) m=z;
     return(m);
```

```
}
```

1.8 题

```
#include <iostream>
using namespace std;
int main()
{
  int a,b,c;
  cin>>a>>b;
  c=a+b;
  cout<<"a+b="<<a+b<<endl;
  return 0;
}
```

1.9 题

```
#include <iostream>
using namespace std;
int main()
{
  int a,b,c;
  int add(int x,int y);
  cin>>a>>b;
  c=add(a,b);
  cout<<"a+b="<<c<<endl;
```

```
  return 0;
}

int add(int x,int y)
{int z;
  z=x+y;
  return(z);
}
```

2.3 题

```
#include <iostream>
using namespace std;
int main()
  {char c1='a',c2='b',c3='c',c4='\101',c5='\116';
    cout<<c1<<c2<<c3<<'\n';
    cout<<"\t\b"<<c4<<'\t'<<c5<<'\n';
    return 0;
}
```

2.4 题

```
#include <iostream>
using namespace std;
int main()
  {char c1='C',c2='+',c3='+';
```

```
   cout<<"I say: \""<<c1<<c2<<c3<<'\"';
   cout<<"\t\t"<<"He says: \"C++ is very interesting!\""<<
'\n';
   return 0;
}
```

2.7 题

```
#include <iostream>
using namespace std;
int main()
{int   i,j,m,n;
 i=8;
 j=10;
 m=++i+j++;
 n=(++i)+(++j)+m;
 cout<<i<<'\t'<<j<<'\t'<<m<<'\t'<<n<<endl;
 return 0;
}
```

2.8 题

```
#include <iostream>
using namespace std;
int main()
{char c1='C', c2='h', c3='i', c4='n', c5='a';
```

```
  c1+=4;
  c2+=4;
  c3+=4;
  c4+=4;
  c5+=4;
  cout<<"password is:"<<c1<<c2<<c3<<c4<<c5<<endl;
  return 0;
}
```

3.2 题

```
#include <iostream>
#include <iomanip>
using namespace std;
int main ( )
{float h,r,l,s,sq,vq,vz;
  const float pi=3.1415926;
  cout<<"please enter r,h:";
  cin>>r>>h;
  l=2*pi*r;
  s=r*r*pi;
  sq=4*pi*r*r;
  vq=3.0/4.0*pi*r*r*r;
  vz=pi*r*r*h;
```

```
 cout<<setiosflags(ios::fixed)<<setiosflags(ios::right)
     <<setprecision(2);
 cout<<"l= "<<setw(10)<<l<<endl;
 cout<<"s= "<<setw(10)<<s<<endl;
 cout<<"sq="<<setw(10)<<sq<<endl;
 cout<<"vq="<<setw(10)<<vq<<endl;
 cout<<"vz="<<setw(10)<<vz<<endl;
 return 0;
}
```

3.3 题

```
#include <iostream>
using namespace std;
int main ()
{float c,f;
 cout<<"请输入一个华氏温度:";
 cin>>f;
 c=(5.0/9.0)*(f-32);              //注意 5 和 9 要用实型表示,否则
```

5/9 值为 0

```
 cout<<"摄氏温度为:"<<c<<endl;
 return 0;
};
```

3.4 题

```
#include <iostream>
using namespace std;
int main ( )
{char c1,c2;
 cout<<"请输入两个字符 c1,c2:";
 c1=getchar();              //将输入的第一个字符赋给 c1
 c2=getchar();              //将输入的第二个字符赋给 c2
 cout<<"用 putchar 函数输出结果为:";
 putchar(c1);
 putchar(c2);
 cout<<endl;
 cout<<"用 cout 语句输出结果为:";
 cout<<c1<<c2<<endl;
 return 0;
}
```

3.4 题另一解

```
#include <iostream>
using namespace std;
int main ( )
{char c1,c2;
 cout<<"请输入两个字符 c1,c2:";
```

```
 c1=getchar();              //将输入的第一个字符赋给 c1
 c2=getchar();              //将输入的第二个字符赋给 c2
 cout<<"用 putchar 函数输出结果为:";
 putchar(c1);
 putchar(44);
 putchar(c2);
 cout<<endl;
 cout<<"用 cout 语句输出结果为:";
 cout<<c1<<","<<c2<<endl;
 return 0;
}
```

3.5 题

```
#include <iostream>
using namespace std;
int main ( )
{char c1,c2;
 int i1,i2;                          //定义为整型
 cout<<"请输入两个整数 i1,i2:";
 cin>>i1>>i2;
 c1=i1;
 c2=i2;
 cout<<"按字符输出结果为:"<<c1<<" , "<<c2<<endl;
```

```
  return 0;
}
```

3.8 题

```
#include <iostream>
using namespace std;
int main ( )
{ int a=3,b=4,c=5,x,y;
   cout<<(a+b>c && b==c)<<endl;
   cout<<(a||b+c && b-c)<<endl;
   cout<<(!(a>b) && !c||1)<<endl;
   cout<<(!(x=a) && (y=b) && 0)<<endl;
   cout<<(!(a+b)+c-1 && b+c/2)<<endl;
   return 0;
}
```

3.9 题

```
include <iostream>
using namespace std;
int main ( )
   {int a,b,c;
     cout<<"please enter three integer numbers:";
     cin>>a>>b>>c;
     if(a<b)
```

```
        if(b<c)
           cout<<"max="<<c;
        else
           cout<<"max="<<b;
      else if (a<c)
            cout<<"max="<<c;
      else
            cout<<"max="<<a;
      cout<<endl;
    return 0;
  }
```

3.9 题另一解

```
#include <iostream>
using namespace std;
int main ( )
   {int a,b,c,temp,max ;
    cout<<"please enter three integer numbers:";
    cin>>a>>b>>c;
    temp=(a>b)?a:b;                    /*   将 a 和 b 中的大者
存入 temp 中  */
    max=(temp>c)?temp:c;                /*   将 a 和 b 中的大
```

者与 c 比较，最大者存入 max

*/

```
    cout<<"max="<<max<<endl;
    return 0;
  }
```

3.10 题

```
#include <iostream>
using namespace std;
int main ( )
  {int x,y;
    cout<<"enter x:";
    cin>>x;
    if (x<1)
        {y=x;
         cout<<"x="<<x<<", y=x="<<y;
        }
    else if (x<10)                          // 1≤x＜10
         {y=2*x-1;
          cout<<"x="<<x<<", y=2*x-1="<<y;
         }
          else                                  // x≥10
```

```
            {y=3*x-11;
             cout<<"x="<<x<<", y=3*x-11="<<y;
            }
      cout<<endl;
    return 0;
}
```

3.11 题

```
#include <iostream>
using namespace std;
int main ()
 {float score;
  char grade;
  cout<<"please enter score of student:";
  cin>>score;
  while (score>100||score<0)
    {cout<<"data error,enter data again.";
      cin>>score;
     }
 switch(int(score/10))
        {case 10:
          case 9: grade='A';break;
          case 8: grade='B';break;
```

```
            case 7: grade='C';break;
            case 6: grade='D';break;
            default:grade='E';
          }
    cout<<"score is "<<score<<", grade is "<<grade<<endl;
    return 0;
}
```

3.12 题

```
#include <iostream>
using namespace std;
int main ()
{long int num;
   int indiv,ten,hundred,thousand,ten_thousand,place;
                                        /*分别代表个位,十位,百位,千位,万位和位数
*/
   cout<<"enter an integer(0~99999):";
   cin>>num;
   if (num>9999)
         place=5;
   else   if (num>999)
```

```
        place=4;
    else   if (num>99)
        place=3;
    else   if (num>9)
        place=2;
    else place=1;
    cout<<"place="<<place<<endl;
    //计算各位数字
    ten_thousand=num/10000;
    thousand=(int)(num-ten_thousand*10000)/1000;

hundred=(int)(num-ten_thousand*10000-thousand*1000)/
100;

ten=(int)(num-ten_thousand*10000-thousand*1000-hund
red*100)/10;

indiv=(int)(num-ten_thousand*10000-thousand*1000-hun
dred*100-ten*10);
    cout<<"original order:";
    switch(place)
      {case
```

```
5:cout<<ten_thousand<<","<<thousand<<","<<hundred<
<","<<ten<<","<<indiv<<en
dl;
          cout<<"reverse order:";

cout<<indiv<<ten<<hundred<<thousand<<ten_thousand<
<endl;
          break;
        case
4:cout<<thousand<<","<<hundred<<","<<ten<<","<<indiv
<<endl;
          cout<<"reverse order:";
          cout<<indiv<<ten<<hundred<<thousand<<endl;
          break;
        case
3:cout<<hundred<<","<<ten<<","<<indiv<<endl;
          cout<<"reverse order:";
          cout<<indiv<<ten<<hundred<<endl;
          break;
        case 2:cout<<ten<<","<<indiv<<endl;
          cout<<"reverse order:";
          cout<<indiv<<ten<<endl;
```

```
            break;
        case 1:cout<<indiv<<endl;
            cout<<"reverse order:";
            cout<<indiv<<endl;
            break;
    }
    return 0;
}
```

3.13 题

```
#include <iostream>
using namespace std;
int main ()
{ long i;                                   //i 为利润
    float    bonus,bon1,bon2,bon4,bon6,bon10;
    bon1=100000*0.1;                        //利润为 10 万元时的奖金
    bon2=bon1+100000*0.075;                 //利润为 20 万元时的奖
金
    bon4=bon2+100000*0.05;                  //利润为 40 万元时的奖
金
    bon6=bon4+100000*0.03;                  //利润为 60 万元时的奖
金
    bon10=bon6+400000*0.015;                //利润为 100 万元时的
```

奖金

```
cout<<"enter i:";
cin>>i;
if (i<=100000)
    bonus=i*0.1;                          //利润在 10 万元以
```

内按 10%提成奖金

```
else if (i<=200000)
    bonus=bon1+(i-100000)*0.075;      //利润在 10 万元至
```

20 万时的奖金

```
else if (i<=400000)
    bonus=bon2+(i-200000)*0.05;       //利润在 20 万元至
```

40 万时的奖金

```
else if (i<=600000)
    bonus=bon4+(i-400000)*0.03;       //利润在 40 万元至
```

60 万时的奖金

```
else if (i<=1000000)
    bonus=bon6+(i-600000)*0.015;      //利润在 60 万元至
```

100 万时的奖金

```
else
    bonus=bon10+(i-1000000)*0.01;     //利润在 100 万元
```

以上时的奖金

```
cout<<"bonus="<<bonus<<endl;
```

```
   return 0;
  }
```

3.13 题另一解

```
#include <iostream>
using namespace std;
int main ()
{long i;
 float bonus,bon1,bon2,bon4,bon6,bon10;
 int c;
 bon1=100000*0.1;
 bon2=bon1+100000*0.075;
 bon4=bon2+200000*0.05;
 bon6=bon4+200000*0.03;
 bon10=bon6+400000*0.015;
 cout<<"enter i:";
 cin>>i;
 c=i/100000;
 if (c>10)    c=10;
 switch(c)
  {case 0: bonus=i*0.1; break;
    case 1: bonus=bon1+(i-100000)*0.075; break;
    case 2:
```

```
    case 3: bonus=bon2+(i-200000)*0.05;break;
    case 4:
    case 5: bonus=bon4+(i-400000)*0.03;break;
    case 6:
    case 7:
    case 8:
    case 9: bonus=bon6+(i-600000)*0.015; break;
    case 10: bonus=bon10+(i-1000000)*0.01;
    }
   cout<<"bonus="<<bonus<<endl;
   return 0;
}
```

3.14 题

```
#include <iostream>
using namespace std;
int main ()
{int t,a,b,c,d;
 cout<<"enter four numbers:";
 cin>>a>>b>>c>>d;
 cout<<"a="<<a<<",                                    b="<<b<<",
c="<<c<<",d="<<d<<endl;
 if (a>b)
```

```
 {t=a;a=b;b=t;}
 if (a>c)
  {t=a; a=c; c=t;}
 if (a>d)
  {t=a; a=d; d=t;}
 if (b>c)
  {t=b; b=c; c=t;}
 if (b>d)
  {t=b; b=d; d=t;}
 if (c>d)
    {t=c; c=d; d=t;}
 cout<<"the sorted sequence:"<<endl;
 cout<<a<<", "<<b<<", "<<c<<", "<<d<<endl;
 return 0;
 }
```

3.15 题

```
#include <iostream>
using namespace std;
int main ()
{int p,r,n,m,temp;
 cout<<"please enter two positive integer numbers
n,m:";
```

```
 cin>>n>>m;
 if (n<m)
       {temp=n;
        n=m;
        m=temp;                          //把大数放在 n 中，小数放在
m 中
       }
 p=n*m;                                  //先将 n 和 m 的乘积保存在 p
中，以便求最小公倍数时用
 while (m!=0)                            //求 n 和 m 的最大公约数
     {r=n%m;
       n=m;
       m=r;
 }
 cout<<"HCF="<<n<<endl;
 cout<<"LCD="<<p/n<<endl;                //  p 是原来两个整数的
乘积
 return 0;
 }
```

3.16 题

```
#include <iostream>
using namespace std;
int main ()
{char c;
 int letters=0,space=0,digit=0,other=0;
 cout<<"enter one line::"<<endl;
 while((c=getchar())!='\n')
 {if (c>='a' && c<='z'||c>='A' && c<='Z')
        letters++;
  else if (c==' ')
        space++;
  else if (c>='0' && c<='9')
        digit++;
  else
        other++;
  }
  cout<<"letter:"<<letters<<",          space:"<<space<<",
digit:"<<digit<<",
other:"<<other<<endl;
  return 0;
  }
```

3.17 题

```
#include <iostream>
using namespace std;
int main ()
{int    a,n,i=1,sn=0,tn=0;
 cout<<"a,n=:";
 cin>>a>>n;
 while (i<=n)
  {tn=tn+a;              //赋值后的 tn 为 i 个 a 组成数的值
   sn=sn+tn;             //赋值后的 sn 为多项式前 i 项之和
   a=a*10;
   ++i;
  }
  cout<<"a+aa+aaa+...="<<sn<<endl;
  return 0;
  }
```

3.18 题

```
#include <iostream>
using namespace std;
int main ()
{float s=0,t=1;
  int n;
```

```
  for (n=1;n<=20;n++)
  {
   t=t*n;          //  求 n!
   s=s+t;          //  将各项累加
  }
  cout<<"1!+2!+...+20!="<<s<<endl;
  return 0;
  }
```

3.19 题

```
#include <iostream>
using namespace std;
int main ()
{int i,j,k,n;
 cout<<"narcissus numbers are:"<<endl;
       for (n=100;n<1000;n++)
        {i=n/100;
         j=n/10-i*10;
         k=n%10;
         if (n == i*i*i + j*j*j + k*k*k)
            cout<<n<<" ";
        }
```

```
      cout<<endl;
    return 0;
  }
```

3.20 题

```
#include <iostream>
using namespace std;
 int main()
 {const int m=1000;          // 定义寻找范围
  int k1,k2,k3,k4,k5,k6,k7,k8,k9,k10;
  int i,a,n,s;
  for (a=2;a<=m;a++)         // a 是 2~1000 之间的整数，检查
```

它是否为完数

```
    {n=0;                    // n 用来累计 a 的因子的个数
     s=a;                    // s 用来存放尚未求出的因子之和，
```

开始时等于 a

```
       for (i=1;i<a;i++)     // 检查 i 是否为 a 的因子
          if (a%i==0)        // 如果 i 是 a 的因子
    {n++;                    // n 加 1，表示新找到一个因子
     s=s-i;                  // s 减去已找到的因子，s 的新值是
```

尚未求出的因子

之和

```
     switch(n)               // 将找到的因子赋给 k1,...,k10
```

```
    {case 1:
        k1=i;   break;    // 找出的第 1 个因子赋给 k1
     case 2:
        k2=i;   break;    // 找出的第 2 个因子赋给 k2
     case 3:
        k3=i;   break;    // 找出的第 3 个因子赋给 k3
     case 4:
        k4=i;   break;    // 找出的第 4 个因子赋给 k4
     case 5:
        k5=i;   break;    // 找出的第 5 个因子赋给 k5
     case 6:
        k6=i;   break;     // 找出的第 6 个因子赋给 k6
     case 7:
        k7=i;   break;    // 找出的第 7 个因子赋给 k7
     case 8:
        k8=i;   break;     // 找出的第 8 个因子赋给 k8
     case 9:
        k9=i;   break;    // 找出的第 9 个因子赋给 k9
     case 10:
        k10=i;   break;    // 找出的第 10 个因子赋给 k10
    }
}
```

```
      if (s==0)                    // s=0 表示全部因子都已找到了
       {cout<<a<<" is a  完数"<<endl;
       cout<<"its factors are:";
         if (n>1)   cout<<k1<<","<<k2;      // n>1 表示 a 至少有
2 个因子
         if (n>2)   cout<<","<<k3; // n>2 表示至少有 3 个因子，
故应再输出一个因子
         if (n>3)   cout<<","<<k4; // n>3 表示至少有 4 个因子，
故应再输出一个因子
         if (n>4)   cout<<","<<k5;            //   以下类似
         if (n>5)   cout<<","<<k6;
         if (n>6)   cout<<","<<k7;
         if (n>7)  cout<<","<<k8;
         if (n>8)  cout<<","<<k9;
         if (n>9)  cout<<","<<k10;
         cout<<endl<<endl;
      }
    }
  return 0;
 }
```

3.20 题另一解

```
#include <iostream>
```

```
using namespace std;
 int main()
  {int m,s,i;
   for (m=2;m<1000;m++)
    {s=0;
     for (i=1;i<m;i++)
        if ((m%i)==0) s=s+i;
     if(s==m)
      {cout<<m<<" is a 完数"<<endl;
       cout<<"its factors are:";
        for (i=1;i<m;i++)
          if (m%i==0)   cout<<i<<" ";
        cout<<endl;
       }
    }
   return 0;
 }
```

3.20 题另一解

```
#include <iostream>
using namespace std;
int main()
  {int k[11];
```

```
    int i,a,n,s;
    for (a=2;a<=1000;a++)
    {n=0;
     s=a;
     for (i=1;i<a;i++)
       if ((a%i)==0)
          {n++;
           s=s-i;
           k[n]=i;                    // 将找到的因子赋给 k[1]---k[10]
          }
    if (s==0)
     {cout<<a<<" is a 完数"<<endl;
       cout<<"its factors are:";
       for (i=1;i<n;i++)
          cout<<k[i]<<" ";
       cout<<k[n]<<endl;
       }
    }
    return 0;
}
```

3.21 题

```
#include <iostream>
using namespace std;
int main()
   {int i,t,n=20;
    double a=2,b=1,s=0;
    for (i=1;i<=n;i++)
    {s=s+a/b;
     t=a;
     a=a+b;                    // 将前一项分子与分母之和作为下一项的分子
     b=t;                      // 将前一项的分子作为下一项的分母
    }
    cout<<"sum="<<s<<endl;
    return 0;
    }
```

3.22 题

```
#include <iostream>
using namespace std;
int main()
   {int day,x1,x2;
    day=9;
```

```
    x2=1;
    while(day>0)
     {x1=(x2+1)*2;            // 第 1 天的桃子数是第 2 天桃子数
加 1 后的 2 倍
       x2=x1;
       day--;
     }
    cout<<"total="<<x1<<endl;
    return 0;
    }
```

3.23 题

```
#include <iostream>
#include <cmath>
using namespace std;
int main()
 {float a,x0,x1;
   cout<<"enter a positive number:";
   cin>>a;                  // 输入 a 的值
   x0=a/2;
   x1=(x0+a/x0)/2;
   do
```

```
    {x0=x1;
     x1=(x0+a/x0)/2;
     }
  while(fabs(x0-x1)>=1e-5);
  cout<<"The square root of "<<a<<" is "<<x1<<endl;
  return 0;
 }
```

3.24 题

```
#include <iostream>
using namespace std;
int main()
  {int i,k;
    for (i=0;i<=3;i++)              // 输出上面 4 行*号
      {for (k=0;k<=2*i;k++)
         cout<<"*";                 // 输出*号
        cout<<endl;                 //输出完一行*号后换行
      }
    for (i=0;i<=2;i++)              // 输出下面 3 行*号
      {for (k=0;k<=4-2*i;k++)
         cout<<"*";                 // 输出*号
        cout<<endl;                 // 输出完一行*号后换行
```

```
        }
    return 0;
     }
```

3.25 题

```
#include <iostream>
using namespace std;
int main()
  {char  i,j,k;                          /* i 是 a 的对手;j 是 b 的对手;k
是 c 的对手*/
    for (i='X';i<='Z';i++)
       for (j='X';j<='Z';j++)
           if (i!=j)
              for (k='X';k<='Z';k++)
               if (i!=k && j!=k)
                  if (i!='X' && k!='X' && k!='Z')
                     cout<<"A--"<<i<<"                    B--"<<j<<"
C--"<<k<<endl;
      return 0;
    }
```

4.1 题

```
#include <iostream>
using namespace std;
int main()
   {int hcf(int,int);
     int lcd(int,int,int);
     int u,v,h,l;
     cin>>u>>v;
     h=hcf(u,v);
     cout<<"H.C.F="<<h<<endl;
     l=lcd(u,v,h);
     cout<<"L.C.D="<<l<<endl;
     return 0;
   }

int hcf(int u,int v)
  {int t,r;
    if (v>u)
       {t=u;u=v;v=t;}
         while ((r=u%v)!=0)
              {u=v;
               v=r;}
               return(v);
```

```
        }

int lcd(int u,int v,int h)
 {return(u*v/h);
                              }
```

4.2 题

```
#include <iostream>
#include <math.h>
using namespace std;
float x1,x2,disc,p,q;
int main()
{void greater_than_zero(float,float);
 void equal_to_zero(float,float);
 void smaller_than_zero(float,float);
 float a,b,c;
 cout<<"input a,b,c:";
 cin>>a>>b>>c;
 disc=b*b-4*a*c;
 cout<<"root:"<<endl;
 if (disc>0)
```

```
  {
    greater_than_zero(a,b);
    cout<<"x1="<<x1<<",x2="<<x2<<endl;
  }
 else if (disc==0)
  {equal_to_zero(a,b);
    cout<<"x1="<<x1<<",x2="<<x2<<endl;
  }
 else
  {smaller_than_zero(a,b);
    cout<<"x1="<<p<<"+"<<q<<"i"<<endl;
    cout<<"x2="<<p<<"-"<<q<<"i"<<endl;
  }
 return 0;
}

void greater_than_zero(float a,float b)    /* 定义一个函数，
用来求 disc>0 时方
程的根 */
 {x1=(-b+sqrt(disc))/(2*a);
  x2=(-b-sqrt(disc))/(2*a);
 }
```

```
void equal_to_zero(float a,float b)        /* 定义一个函数，用
来求 disc=0 时方程
的根 */
 {
   x1=x2=(-b)/(2*a);
 }

void smaller_than_zero(float a,float b)   /* 定义一个函数，
用来求 disc<0 时方
程的根 */
 {
   p=-b/(2*a);
   q=sqrt(-disc)/(2*a);
 }
```

4.3 题

```
#include <iostream>
using namespace std;
int main()
 {int prime(int);                          /* 函数原型声明 */
   int n;
```

```
  cout<<"input an integer:";
  cin>>n;
  if (prime(n))
     cout<<n<<" is a prime."<<endl;
  else
     cout<<n<<" is not a prime."<<endl;
  return 0;
}

int prime(int n)
 {int flag=1,i;
   for (i=2;i<n/2 && flag==1;i++)
      if (n%i==0)
         flag=0;
   return(flag);
  }
```

4.4 题

```
#include <iostream>
using namespace std;
int main()
```

```
 {int fac(int);
  int a,b,c,sum=0;
  cout<<"enter a,b,c:";
  cin>>a>>b>>c;
  sum=sum+fac(a)+fac(b)+fac(c);
  cout<<a<<"!+"<<b<<"!+"<<c<<"!="<<sum<<endl;
  return 0;
 }

 int fac(int n)
  {int f=1;
    for (int i=1;i<=n;i++)
       f=f*i;
    return f;
  }
```

4.5 题

```
#include <iostream>
#include <cmath>
using namespace std;
int main()
 {double e(double);
  double x,sinh;
```

```
  cout<<"enter x:";
  cin>>x;
  sinh=(e(x)+e(-x))/2;
  cout<<"sinh("<<x<<")="<<sinh<<endl;
  return 0;
 }

 double e(double x)
  {return exp(x);}
```

4.6 题

```
#include <iostream>
#include <cmath>
using namespace std;
int main()
{double solut(double ,double ,double ,double );
 double a,b,c,d;
 cout<<"input a,b,c,d:";
 cin>>a>>b>>c>>d;
 cout<<"x="<<solut(a,b,c,d)<<endl;
```

```
  return 0;
}

double solut(double a,double b,double c,double d)
 {double x=1,x0,f,f1;
   do
    {x0=x;
      f=((a*x0+b)*x0+c)*x0+d;
      f1=(3*a*x0+2*b)*x0+c;
      x=x0-f/f1;
    }
   while(fabs(x-x0)>=1e-5);
   return(x);
}
```

4.7 题

```
#include <iostream>
#include <cmath>
using namespace std;
int main()
{void godbaha(int);
  int n;
  cout<<"input n:";
```

```
 cin>>n;
 godbaha(n);
 return 0;
}
void godbaha(int n)
{int prime(int);
 int a,b;
 for(a=3;a<=n/2;a=a+2)
    {if(prime(a))
        {b=n-a;
          if (prime(b))
             cout<<n<<"="<<a<<"+"<<b<<endl;}
      }
}

int prime(int m)
{int i,k=sqrt(m);
 for(i=2;i<=k;i++)
    if(m%i==0) break;
 if (i>k) return 1;
 else        return 0;
}
```

4.8 题

```
#include <iostream>
using namespace std;
int main()
 {int x,n;
  float p(int,int);
  cout<<"input n & x:";
  cin>>n>>x;
  cout<<"n="<<n<<",x="<<x<<endl;;
  cout<<"P"<<n<<"(x)="<<p(n,x)<<endl;
  return 0;
 }

float p(int n,int x)
 {if (n==0)
     return(1);
  else if (n==1)
     return(x);
  else
     return(((2*n-1)*x*p((n-1),x)-(n-1)*p((n-2),x))/n);
```

```
 }
```

4.9 题

```
#include <iostream>
using namespace std;
int main()
{void hanoi(int n,char one,char two,char three);
 int m;
 cout<<"input the number of diskes:";
 cin>>m;
 cout<<"The steps of moving "<<m<<" disks:"<<endl;
 hanoi(m,'A','B','C');
 return 0;
}

void hanoi(int n,char one,char two,char three)
     //将 n 个盘从 one 座借助 two 座，移到 three 座
 {void move(char x,char y);
  if(n==1) move(one,three);
  else
  {hanoi(n-1,one,three,two);
    move(one,three);
```

```
    hanoi(n-1,two,one,three);
   }
}

void move(char x,char y)
 {cout<<x<<"-->"<<y<<endl;}
```

4.10 题

```
#include <iostream>
using namespace std;
int main()
{void convert(int n);
 int number;
 cout<<"input an integer:";
 cin>>number;
 cout<<"output:"<<endl;
 if (number<0)
  {cout<<"-";
    number=-number;
    }
  convert(number);
  cout<<endl;
  return 0;
```

```
}

void convert(int n)
 {int i;
   char c;
   if ((i=n/10)!=0)
      convert(i);
   c=n%10+'0';
   cout<<" "<<c;
   }
```

4.11 题

```
#include <iostream>
using namespace std;
int main()
{int f(int);
 int n,s;
 cout<<"input the number n:";
 cin>>n;
 s=f(n);
 cout<<"The result is "<<s<<endl;
 return 0;
```

```
}

int f(int n)
 {;
   if (n==1)
        return 1;
   else
        return (n*n+f(n-1));
}
```

4.12 题

```
#include <iostream>
#include <cmath>
using namespace std;
#define S(a,b,c)    (a+b+c)/2
#define                                                    AREA(a,b,c)
sqrt(S(a,b,c)*(S(a,b,c)-a)*(S(a,b,c)-b)*(S(a,b,c)-c))
int main()
 {float a,b,c;
   cout<<"input a,b,c:";
```

```
  cin>>a>>b>>c;
  if (a+b>c && a+c>b && b+c>a)
     cout<<"area="<<AREA(a,b,c)<<endl;
  else
     cout<<"It is not a triangle!"<<endl;
  return 0;
 }
```

4.14 题

```
#include <iostream>
using namespace std;
//#define LETTER 1
int main()
{char c;
 cin>>c;
 #if LETTER
       if(c>='a' && c<='z')
          c=c-32;
 #else
       if(c>='A' && c<='Z')
          c=c+32;
 #endif
```

```
 cout<<c<<endl;
 return 0;
}
```

4.15 题

```
#include <iostream>
using namespace std;
#define CHANGE 1
int main()
{char ch[40];
 cout<<"input text:"<<endl;;
 gets(ch);
 #if (CHANGE)
    {for (int i=0;i<40;i++)
       {if (ch[i]!='\0')
          if (ch[i]>='a'&& ch[i]<'z'||ch[i]>'A'&& ch[i]<'Z')
              ch[i]+=1;
          else if (ch[i]=='z'||ch[i]=='Z')
              ch[i]-=25;
       }
    }
 #endif
```

```
  cout<<"output:"<<endl<<ch<<endl;
  return 0;
}
```

4.16 题 file

```
#include <iostream>
using namespace std;
int a;
int main()
  {extern int power(int);
    int b=3,c,d,m;
    cout<<"enter an integer a and its power m:"<<endl;
    cin>>a>>m;
    c=a*b;
    cout<<a<<"*"<<b<<"="<<c<<endl;
    d=power(m);
    cout<<a<<"**"<<m<<"="<<d<<endl;
    return 0;
  }
```

4.16 题 file

```
extern int a;
int power(int n)
  {int i,y=1;
```

```
  for(i=1;i<=n;i++)
    y*=a;
  return y;
 }
```

5.1 题

```
#include <iostream>
#include <iomanip>
using namespace std;
#include <math.h>
int main()
 {int i,j,n,a[101];
  for (i=1;i<=100;i++)
     a[i]=i;
  a[1]=0;
  for (i=2;i<sqrt(100);i++)
     for (j=i+1;j<=100;j++)
         {if(a[i]!=0 && a[j]!=0)
           if (a[j]%a[i]==0)
             a[j]=0;   }
     cout<<endl;
```

```
    for (i=1,n=0;i<=100;i++)
     {if (a[i]!=0)
        {cout<<setw(5)<<a[i]<<" ";
         n++;}
       if(n==10)
         {cout<<endl;
            n=0;}
     }
   cout<<endl;
   return 0;
   }
```

5.2 题

```
#include <iostream>
using namespace std;
//#include <math.h>
int main()
  {int i,j,min,temp,a[11];
   cout<<"enter data:"<<endl;
   for (i=1;i<=10;i++)
   {cout<<"a["<<i<<"]=";
    cin>>a[i];                          //输入 10 个数
```

```
    }
    cout<<endl<<"The original numbers:"<<endl;;
    for (i=1;i<=10;i++)
       cout<<a[i]<<" ";                    //  输出这 10 个数
    cout<<endl;;
    for (i=1;i<=9;i++)                     //以下 8 行是对 10 个数排序
       {min=i;
        for (j=i+1;j<=10;j++)
           if (a[min]>a[j]) min=j;
            temp=a[i];                     //以下 3 行将 a[i+1]～a[10]
中最小者与 a[i]  对换
            a[i]=a[min];
            a[min]=temp;
        }
    cout<<endl<<"The sorted numbers:"<<endl;
    for (i=1;i<=10;i++)                    //  输出已排好序的 10 个数
       cout<<a[i]<<" ";
    cout<<endl;
    return 0;
}
```

5.3 题

```
#include <iostream>
using namespace std;
int main()
 {int a[3][3],sum=0;
   int i,j;
   cout<<"enter data:"<<endl;;
    for (i=0;i<3;i++)
       for (j=0;j<3;j++)
          cin>>a[i][j];
    for (i=0;i<3;i++)
       sum=sum+a[i][i];
    cout<<"sum="<<sum<<endl;
    return 0;
   }
```

5.4 题

```
#include <iostream>
using namespace std;
int main()
 {int a[11]={1,4,6,9,13,16,19,28,40,100};
    int num,i,j;
    cout<<"array a:"<<endl;
    for (i=0;i<10;i++)
```

```
      cout<<a[i]<<" ";
   cout<<endl;;
   cout<<"insert data:";
   cin>>num;
   if (num>a[9])
      a[10]=num;
   else
    {for (i=0;i<10;i++)
      {if (a[i]>num)
         {for (j=9;j>=i;j--)
            a[j+1]=a[j];
          a[i]=num;
       break;
         }
       }
      }
  cout<<"Now, array a:"<<endl;
  for (i=0;i<11;i++)
     cout<<a[i]<<" ";
  cout<<endl;
  return 0;
}
```

5.5 题

```
#include <iostream>
using namespace std;
int main()
{ const int n=5;
   int a[n],i,temp;
   cout<<"enter array a:"<<endl;
   for (i=0;i<n;i++)
      cin>>a[i];
   cout<<"array a:"<<endl;
   for (i=0;i<n;i++)
    cout<<a[i]<<" ";
   for  (i=0;i<n/2;i++)                    //循环的作用是将对称的元素的值互换
      { temp=a[i];
         a[i]=a[n-i-1];
         a[n-i-1]=temp;
       }
   cout<<endl<<"Now,array a:"<<endl;
   for (i=0;i<n;i++)
      cout<<a[i]<<" ";
   cout<<endl;
```

```
    return 0;
}
```

5.6 题

```
#include <iostream>
#include <iomanip>
using namespace std;
int main()
 {const int n=11;
   int i,j,a[n][n];
   for (i=1;i<n;i++)
      {a[i][i]=1;
        a[i][1]=1;
      }
   for (i=3;i<n;i++)
      for (j=2;j<=i-1;j++)
           a[i][j]=a[i-1][j-1]+a[i-1][j];
   for (i=1;i<n;i++)
      {for (j=1;j<=i;j++)
           cout<<setw(5)<<a[i][j]<<" ";
        cout<<endl;
      }
```

```
   cout<<endl;
   return 0;
}
```

5.7 题

```
#include <iostream>
using namespace std;
int main()
{ const int n=4,m=5;              //假设数组为 4 行 5 列
   int i,j,a[n][m],max,maxj;
   bool flag;
   for (i=0;i<n;i++)              //输入数组
       for (j=0;j<m;j++)
         cin>>a[i][j];
   for (i=0;i<n;i++)
    {max=a[i][0]; maxj=0;
      for (j=0;j<m;j++)          //找出第 i 行中的最大数
       if (a[i][j]>max)
          {max=a[i][j];          //将本行的最大数存放在 max 中
           maxj=j;                    //将最大数所在的列号存放在
maxj 中
          }
      flag=true;                 //先假设是鞍点，以 flag 为真代表
```

```
      for (int k=0;k<n;k++)
       if (max>a[k][maxj])   //将最大数和其同列元素相比
           {flag=false;        //如果 max 不是同列最小，表示不是
```
鞍点令 flag1 为
假
```
             continue;}
      if(flag)                    //如果 flag1 为真表示是鞍点
    {cout<<"a["<<i<<"]["<<"["<<maxj<<"]="<<max<<endl;
                                  //输出鞍点的值和所在行列号
      break;
     }
   }
   if(!flag)                    //如果 flag 为假表示鞍点不存在
      cout<<"It does not exist!"<<endl;
     return 0;
   }
```

5.8 题

```
#include <iostream>
using namespace std;
int main()
{ const int n=7;
```

```
int i,number,top,bott,mid,loca,a[n];
bool flag=true,sign;
char c;
cout<<"enter data:"<<endl;;
cin>>a[0];
i=1;
while(i<n)
 {cin>>a[i];
   if (a[i]>=a[i-1])
      i++;
   else
      cout<<"enter this data again:";
 }
cout<<endl;
for (i=0;i<n;i++)
   cout<<a[i]<<" ";
cout<<endl;
while(flag)
   {cout<<"input number to look for:";
    cin>>number;
    sign=false;
    top=0;                    //top 是查找区间的起始位置
```

```
        bott=n-1;               //bott 是查找区间的最末位置
        if  ((number<a[0])||(number>a[n-1]))   //要查的数不在
查找区间内
           loca=-1;             //  表示找不到
        while ((!sign) && (top<=bott))
           {mid=(bott+top)/2;
            if (number==a[mid])
             {loca=mid;
               cout<<"Find  "<<number<<", its position is
"<<loca+1<<endl;
             sign=true;
              }
             else if (number<a[mid])
              bott=mid-1;
             else
             top=mid+1;
           }
        if(!sign||loca==-1)
           cout<<number<<" has not found."<<endl;;
        cout<<"continu or not(Y/N)?";
        cin>>c;
        if (c=='N'||c=='n')
```

```
        flag=false;
      }
    return 0;
 }
```

5.9 题

```
#include <iostream>
using namespace std;
int main()
   {int sum_day(int,int);
    int leap(int year);
    int year,month,day,days=0;
    cout<<"input date(year,month,day):";
    cin>>year>>month>>day;
    cout<<year<<"/"<<month<<"/"<<day;
    days=sum_day(month,day);
/*  调用函数一
*/
    if(leap(year)                &&                month>=3)
/*  调用函数二
*/
       days=days+1;
    cout<<" is the "<<days<<"th day in this year."<<endl;
```

```
    return 0;
    }


int sum_day(int month,int day)                  //计算日期
   {int i;
    int
day_tab[12]={31,28,31,30,31,30,31,31,30,31,30,31};
    for (i=0;i<month-1;i++)
        day+=day_tab[i];
    return(day);
   }

int leap(int year)                              //判断是否为闰年
 {int leap;
   leap=year%4==0&&year%100!=0||year%400==0;
   return(leap);
 }
```

5.10 题

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

```
int main()
{int i,j,upper,lower,digit,space,other;
 char text[3][80];
 upper=lower=digit=space=other=0;
 for (i=0;i<3;i++)
    {cout<<"please input line "<<i+1<<endl;
     gets(text[i]);
     for (j=0;j<80 && text[i][j]!='\0';j++)
        {if (text[i][j]>='A'&& text[i][j]<='Z')
            upper++;
         else if (text[i][j]>='a' && text[i][j]<='z')
            lower++;
         else if (text[i][j]>='0' && text[i][j]<='9')
            digit++;
         else if (text[i][j]==' ')
            space++;
         else
            other++;
        }
    }
    cout<<"upper case:"<<upper<<endl;
    cout<<"lower case:"<<lower<<endl;
```

```
    cout<<"digit        :"<<digit<<endl;
    cout<<"space        :"<<space<<endl;
    cout<<"other        :"<<other<<endl;
    return 0;
}
```

5.11 题

```
#include <iostream>
using namespace std;
int main()
{ char a[5]={'*','*','*','*','*'};
   int i,j,k;
   char space=' ';
   for (i=0;i<5;i++)                    // 输出 5 行
    { cout<<endl;                       // 输出每行前先换行
       cout<<"       ";                 // 每行前面留 4 个空格
       for (j=1;j<=i;j++)
          cout<<space;                  // 每行再留一个空格
       for (k=0;k<5;k++)
          cout<<a[k];                   // 每行输出 5 个*号
    }
   cout<<endl;
    return 0;
```

```
}
```

5.11 题另一解

```
#include <iostream>
#include <string>
using namespace std;
int main()
{ string stars="*****";
   int i,j;
   for (i=0;i<5;i++)                    //  输出 5 行
    { cout<<"       ";                    //  每行前面留 4 个空格
       for (j=1;j<=i;j++)
          cout<<" ";                     //  每行再插入 i 个空格
       cout<<stars<<endl;                //  输出 5 个*号
   }
   return 0;
}
```

5.12 题

```
#include <iostream>
using namespace std;
int main()
 {int j,n;
   char ch[80],tran[80];
```

```
 cout<<"input cipher code:";
 gets(ch);
 cout<<"cipher code:"<<ch<<endl;
 j=0;
 while (ch[j]!='\0')
 { if ((ch[j]>='A') && (ch[j]<='Z'))
       tran[j]=155-ch[j];
    else if ((ch[j]>='a') && (ch[j]<='z'))
       tran[j]=219-ch[j];
    else
       tran[j]=ch[j];
    j++;
 }
 n=j;
 cout<<"original text:";
 for (j=0;j<n;j++)
    putchar(tran[j]);
 cout<<endl;
 return 0;
}
```

5.12 题另一解

```
#include <iostream>
using namespace std;
int main()
 {int j,n;
  char ch[80];
  cout<<"input cipher code:";
  gets(ch);
  cout<<"cipher code:"<<ch<<endl;
  j=0;
  while (ch[j]!='\0')
  { if ((ch[j]>='A') && (ch[j]<='Z'))
       ch[j]=155-ch[j];
    else if ((ch[j]>='a') && (ch[j]<='z'))
       ch[j]=219-ch[j];
    else
       ch[j]=ch[j];
    j++;
  }
  n=j;
  cout<<"original text:";
  for (j=0;j<n;j++)
    putchar(ch[j]);
```

```
  cout<<endl;
  return 0;
 }
```

5.12 另一解

```
#include <iostream>
#include <string>
using namespace std;
int main()
 {int j;
  string ch="I will visit China next week.",tran;
  tran=ch;
  cout<<"cipher code:"<<ch<<endl;
  j=0;
  while (j<=ch.size())
  { if ((ch[j]>='A') && (ch[j]<='Z'))
        tran[j]=155-ch[j];
      else if ((ch[j]>='a') && (ch[j]<='z'))
       tran[j]=219-ch[j];
      else
       tran[j]=ch[j];
```

```
      j++;
    }
    cout<<"original text:";
    cout<<tran<<endl;
    return 0;
  }
```

5.12 另一解

```
#include <iostream>
#include <string>
using namespace std;
int main()
 {int j;
   string ch="I will visit China next week.";
   cout<<"cipher code:"<<ch<<endl;
   j=0;
   while (j<=ch.size())
   { if ((ch[j]>='A') && (ch[j]<='Z'))
         ch[j]=155-ch[j];
      else if ((ch[j]>='a') && (ch[j]<='z'))
       ch[j]=219-ch[j];
```

```
      j++;
    }
    cout<<"original text:";
    cout<<ch<<endl;
    return 0;
  }
```

```
    #include <iostream>
#include <string>
using namespace std;
int main()
 {int j;
   string ch="I will visit China next week.";
   cout<<"cipher code:"<<ch<<endl;
   j=0;
   while (j<=ch.size())
   { if ((ch[j]>='A') && (ch[j]<='Z'))
         ch[j]=155-ch[j];
      else if ((ch[j]>='a') && (ch[j]<='z'))
        ch[j]=219-ch[j];
      j++;
```

```
    }
    cout<<"original text:";
    cout<<ch<<endl;
    return 0;
  }
```

5.13 题

```
#include <iostream>
#include <string>
using namespace std;
int main()
{char s1[80],s2[40];
    int i=0,j=0;
    cout<<"input string1:";
    cin>>s1;
    cout<<"input string2:";
    cin>>s2;
    while (s1[i]!='\0')
        i++;
    while(s2[j]!='\0')
        s1[i++]=s2[j++];
```

```
    s1[i]='\0';
    cout<<"The new string is:"<<s1<<endl;
    return 0;
}
```

5.13 另一解

```
#include <iostream>
using namespace std;
int main()
{char s1[80],s2[40];
    cout<<"input string1:";
    cin>>s1;
    cout<<"input string2:";
    cin>>s2;
    strcat(s1,s2);
    cout<<"The new string is:"<<s1<<endl;
    return 0;
}
```

5.13 另一解

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

```
int main()
{ string s1="week",s2="end";
   cout<<"s1="<<s1<<endl;
   cout<<"s2="<<s2<<endl;
   s1=s1+s2;
   cout<<"The new string is:"<<s1<<endl;
   return 0;
}
```

5.14 题

```
#include <iostream>
#include <string>
using namespace std;
int main()
{ const int n=5;
   int i,j;
   string str[n],temp;
   cout<<"please input strings:"<<endl;
   for(i=0;i<n;i++)
        cin>>str[i];
   for(i=0;i<n-1;i++)
```

```
        for(j=0;j<n-i-1;j++)
            if(str[j]>str[j+1])
          {temp=str[j];str[j]=str[j+1];str[j+1]=temp;}
    cout<<endl<<"sorted strings:"<<endl;
    for(i=0;i<n;i++)
        cout<<str[i]<<endl;
    return 0;
}
```

5.15 题

```
#include <iostream>
#include <string>
using namespace std;
int main()
{ const int n=5;
    string str;
    for(int i=0;i<n;i++)
        {cout<<"please input string:";
          cin>>str;
        if(str[0]=='A')
            cout<<str<<endl;}
```

```
    return 0;
}
```

5.16 题

```
#include <iostream>
using namespace std;
int main()
{ const n=10;
    int i;
    char a[n],temp;
    cout<<"please input a string:";
    for(i=0;i<n;i++)
        cin>>a[i];
    for(i=0;i<n/2;i++)
    {temp=a[i];a[i]=a[n-i-1];a[n-i-1]=temp;}
    for(i=0;i<n;i++)
        cout<<a[i];
    cout<<endl;
    return 0;
}
```

5.16 题另一解

```
#include <iostream>
#include <string>
using namespace std;
int main()
{ string a;
   int i,n;
   char temp;
   cout<<"please input a string:";
   cin>>a;
   n=a.size();
   for(i=0;i<n/2;i++)
   {temp=a[i];a[i]=a[n-i-1];a[n-i-1]=temp;}
   cout<<a<<endl;
   return 0;
}
```

5.17 题

```
#include <iostream>
#include <string>
using namespace std;
const int n=10;
string name[n];
int num[n],score[n];
int main()
{int i;
 void input_data();
 input_data();
 cout<<endl<<"The list of failed:"<<endl;
 for(i=0;i<n;i++)
    if(score[i]<60)
       cout<<name[i]<<" "<<num[i]<<"    "<<score[i]<<endl;
  return 0;
}

void input_data()
{int i;
 for (i=0;i<n;i++)
    {cout<<"input name,number and score of student
```

```
"<<i+1<<":";
        cin>>name[i]>>num[i]>>score[i];}
}
```

6.1 题

```
#include <iostream>
#include <string>
using namespace std;
const int n=10;
string name[n];
int num[n],score[n];
int main()
{int i;
  void input_data();
  input_data();
  cout<<endl<<"The list of failed:"<<endl;
  for(i=0;i<n;i++)
     if(score[i]<60)
```

```
        cout<<name[i]<<" "<<num[i]<<"    "<<score[i]<<endl;
   return 0;
}

void input_data()
{int i;
 for (i=0;i<n;i++)
    {cout<<"input name,number and score of student "<<i+1<<":";
      cin>>name[i]>>num[i]>>score[i];}
}
```

6.2 题

```
#include <iostream>
#include <cstring>
using namespace std;
int main()
 {void swap(char *,char *);
   char str1[20],str2[20],str3[20];
   cout<<"input three line:"<<endl;
   gets(str1);
   gets(str2);
```

```
  gets(str3);
  if(strcmp(str1,str2)>0)   swap(str1,str2);
  if(strcmp(str1,str3)>0)   swap(str1,str3);
  if(strcmp(str2,str3)>0)   swap(str2,str3);
  cout<<endl<<"Now,the order is:"<<endl;
  cout<<str1<<endl<<str2<<endl<<str3<<endl;
  return 0;
 }
 void  swap(char  *p1,char  *p2)              /*  交换两个字符串  */
 {char p[20];
  strcpy(p,p1);strcpy(p1,p2);strcpy(p2,p);
 }
```

6.2 题另一解

```
#include <iostream>
#include <string>
using namespace std;
int main()
 {void change(string &,string &);
  string str1="                          ",
         str2="                          ",
```

```
        str3="                              ";
  char *p1=&str1[0],*p2=&str2[0],*p3=&str3[0];
  cout<<"input three line:"<<endl;
  gets(p1);
  gets(p2);
  gets(p3);
  if(str1>str2)change(str1,str2);
  if(str1>str3)change(str1,str3);
  if(str2>str3)change(str2,str3);
  cout<<endl<<"Now,the order is:"<<endl;
  cout<<str1<<endl<<str2<<endl<<str3<<endl;
  return 0;
 }
 void change(string &st1,string &st2)              /* 交换两个字符串 */
 {string st;
  st=st1;st1=st2;st2=st;
 }
```

6.3 题

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

```
int main()
 { void input(int *number);
    void max_min_value(int *number);
    void output(int *number);
    int number[10];
    input(number);                                  // 调用输入
10 个数的函数
    max_min_value(number);                          // 调用交
换函数
    output(number);                                 // 调用输出
函数
    return 0;
}

 void input(int *number)                            // 输入 10 个数的
函数
 {int i;
   cout<<"input 10 numbers:";
   for (i=0;i<10;i++)
      cin>>number[i];
   }
```

```
 void max_min_value(int *number)                    // 交换函数
 { int *max,*min,*p,temp;
    max=min=number;
    for (p=number+1;p<number+10;p++)
       if (*p>*max) max=p;                          // 将大数地址赋
给 max
       else if (*p<*min) min=p;                     // 将小数地址赋
给 min
       temp=number[0];number[0]=*min;*min=temp;   // 将
最小数与第一数交换
       temp=number[9];number[9]=*max;*max=temp;      //
将最小数与第一数交换
  }

void output(int *number)                            // 输出函数
  {int *p;
    cout<<"now,they are:       ";
    for (p=number;p<number+10;p++)
       cout<<*p<<" ";
    cout<<endl;
    return;
    }
```

6.4 题

```
#include <iostream>
using namespace std;
int main()
 {void move(int *array,int n,int m);
  int number[20],n,m,i;
  cout<<"how  many  numbers?";                    //  询问共有多少个数
  cin>>n;
  cout<<"input  "<<n<<"  numbers:"<<endl;       //  要求输入 n 个数
  for (i=0;i<n;i++)
     cin>>number[i];
  cout<<"how many places do you want move?";   //  询问后移多少个位置
  cin>>m;
  move(number,n,m);                                //调用  move 函数
  cout<<"Now,they are:"<<endl;
  for (i=0;i<n;i++)
     cout<<number[i]<<" ";
  cout<<endl;
```

```
   return 0;
}

void move(int *array,int n,int m)                    //使循环后移
一次的函数
 {int *p,array_end;
   array_end=*(array+n-1);
   for (p=array+n-1;p>array;p--)
      *p=*(p-1);
   *array=array_end;
   m--;
   if (m>0) move(array,n,m); //递归调用,当循环次数 m 减至为
0 时,停止调用
 }
```

6.5 题

```
#include <iostream>
using namespace std;
int main()
 {int i,k,m,n,num[50],*p;
   cout<<"input number of person: n=";
   cin>>n;
```

```
    p=num;
    for (i=0;i<n;i++)
       *(p+i)=i+1;                  //  以 1 至 n 为序给每个人编号
    i=0;                             // i 为每次循环时计数变量
    k=0;                             // k 为按 1,2,3 报数时的计数变量
    m=0;                             // m 为退出人数
    while  (m<n-1)                   //  当退出人数比  n-1  少时(即未退
出人数大于 1 时)执行循
环体
    {if (*(p+i)!=0)    k++;
     if (k==3)                       //  将退出的人的编号置为 0
        {*(p+i)=0;
         k=0;
         m++;
        }
     i++;
     if (i==n) i=0;                  //  报数到尾后，i 恢复为 0
     }
    while(*p==0) p++;
    cout<<"The last one is NO."<<*p<<endl;
    return 0;
}
```

6.6 题

```
#include <iostream>
using namespace std;
int main()
 {int length(char *p);
   int len;
   char str[20];
   cout<<"input string:";
   cin>>str;
   len=length(str);
   cout<<"The length of string is "<<len<<endl;
   return 0;
}
int length(char *p)                    //求字符串长度的函数
{int n;
 n=0;
 while (*p!='\0')
   {n++;
     p++;
   }
 return(n);
}
```

6.7 题

```
#include <iostream>
using namespace std;
int main()
 {void copystr(char *,char *,int);
   int m;
   char str1[20],str2[20];
   cout<<"input string:";
   gets(str1);
   cout<<"which character do you want begin to copy?";
   cin>>m;
   if (strlen(str1)<m)
      cout<<"input error!"<<endl;
   else
    {copystr(str1,str2,m);
      cout<<"result:"<<str2<<endl;
    }
   return 0;
}

void copystr(char *p1,char *p2,int m)          //字符串部分复
```

制函数*/

```
{int n;
 n=0;
 while (n<m-1)
  {n++;
   p1++;
  }
 while (*p1!='\0')
   {*p2=*p1;
    p1++;
    p2++;
   }
 *p2='\0';
}
```

6.8 题

```
#include <iostream>
using namespace std;
int main()
{int upper=0,lower=0,digit=0,space=0,other=0,i=0;
char *p,s[20];
cout<<"input string:";
while ((s[i]=getchar())!='\n') i++;
```

```
p=&s[0];
while (*p!='\n')
   {if (('A'<=*p) && (*p<='Z'))
       ++upper;
     else if (('a'<=*p) && (*p<='z'))
       ++lower;
     else if (*p==' ')
       ++space;
     else if ((*p<='9') && (*p>='0'))
       ++digit;
     else
       ++other;
     p++;
   }
cout<<"upper                    case:"<<upper<<endl<<"lower
case:"<<lower<<endl;
cout<<"space:"<<space<<endl<<"digit:"<<digit<<endl<<
"other:"<<other<<endl;
return 0;
}
```

6.9 题

```
#include <iostream>
using namespace std;
int main()
{void move(int *);
 int a[3][3],*p,i;
 cout<<"input matrix:"<<endl;
 for (i=0;i<3;i++)
    cin>>a[i][0]>>a[i][1]>>a[i][2];
 p=&a[0][0];
 move(p);
 cout<<"Now,matrix:"<<endl;
 for (i=0;i<3;i++)
    cout<<a[i][0]<<" "<<a[i][1]<<" "<<a[i][2]<<endl;
 cout<<endl;
 return 0;
}

 void move(int *pointer)
   {int i,j,t;
    for (i=0;i<3;i++)
       for (j=i;j<3;j++)
          {t=*(pointer+3*i+j);
```

```
            *(pointer+3*i+j)=*(pointer+3*j+i);
            *(pointer+3*j+i)=t;
        }
    }
```

6.10 题

```
#include <iostream>
using namespace std;
int main()
{void change(int *p);
 int a[5][5],*p,i,j;
 cout<<"input matrix:"<<endl;
 for (i=0;i<5;i++)                                    //输入矩阵
    for (j=0;j<5;j++)
       cin>>a[i][j];
 p=&a[0][0];                                          //使 p 指向 0 行 0
列元素
 change(p);                                           //调用函数，实
现交换
 cout<<"Now,matrix:"<<endl;
 for (i=0;i<5;i++)                                    //输出已交换的矩阵
  {for (j=0;j<5;j++)
```

```
        cout<<a[i][j]<<" ";
     cout<<endl;
   }
  return 0;
}

void change(int *p)                              //交换函数
 {int i,j,temp;
   int *pmax,*pmin;
   pmax=p;
   pmin=p;
   for  (i=0;i<5;i++)          //找最大值和最小值的地址,并赋给
pmax,pmin
       for (j=i;j<5;j++)
        {if (*pmax<*(p+5*i+j)) pmax=p+5*i+j;
          if (*pmin>*(p+5*i+j)) pmin=p+5*i+j;
        }
   temp=*(p+12);                        //将最大值与中心元素互换
   *(p+12)=*pmax;
   *pmax=temp;

   temp=*p;                             //将最小值与左上角元素互换
```

```
   *p=*pmin;
   *pmin=temp;

   pmin=p+1;
      //将 a[0][1]的地址赋给 pmin，从该位置开始找最小的元素
   for (i=0;i<5;i++)              //找第二最小值的地址赋给 pmin
      for (j=0;j<5;j++)
         if      (((p+5*i+j)!=p)   &&   (*pmin   >   *(p+5*i+j)))
pmin=p+5*i+j;
   temp=*pmin;                        //将第二最小值与右上角元素
互换
   *pmin=*(p+4);
   *(p+4)=temp;

   pmin=p+1;
   for (i=0;i<5;i++)          //找第三最小值的地址赋给 pmin
      for (j=0;j<5;j++)
         if(((p+5*i+j)!=(p+4))          &&          ((p+5*i+j)!=p)
&&(*pmin>*(p+5*i+j))) pmin=p
+5*i+j;
   temp=*pmin;                    // 将第三最小值与左下角元素互
换
```

```
   *pmin=*(p+20);
   *(p+20)=temp;

   pmin=p+1;
   for (i=0;i<5;i++)          // 找第四最小值的地址赋给 pmin */
       for (j=0;j<5;j++)
           if      (((p+5*i+j)!=p)      &&((p+5*i+j)!=(p+4))      &&
((p+5*i+j)!=(p+20)) &&
(*pmin>*(p+5*i+j)))
               pmin=p+5*i+j;
   temp=*pmin;                    //将第四最小值与右下角元素互
换
   *pmin=*(p+24);
   *(p+24)=temp;
   }
```

6.10 题另一解

```
#include <iostream>
using namespace std;
int main()
{void change(int *p);
 int a[5][5],*p,i,j;
```

```
 cout<<"input matrix:"<<endl;
 for (i=0;i<5;i++)                          //输入矩阵
    for (j=0;j<5;j++)
       cin>>a[i][j];
 p=&a[0][0];                                //使 p 指向 0 行 0
列元素
 change(p);                                 //调用函数，实
现交换
 cout<<"Now,matrix:"<<endl;
 for (i=0;i<5;i++)                          //输出已交换的矩阵
  {for (j=0;j<5;j++)
       cout<<a[i][j]<<" ";
    cout<<endl;
  }
 return 0;
}

void change(int *p)                         //交换函数
 {int i,j,temp;
  int *pmax,*pmin;
  pmax=p;
  pmin=p;
```

```
  for  (i=0;i<5;i++)          //找最大值和最小值的地址,并赋给
pmax,pmin
     for (j=i;j<5;j++)
      {if (*pmax<*(p+5*i+j)) pmax=p+5*i+j;
       if (*pmin>*(p+5*i+j)) pmin=p+5*i+j;
      }
  temp=*(p+12);                    //将最大值与中心元素互换
  *(p+12)=*pmax;
  *pmax=temp;

  temp=*p;                         //将最小值与左上角元素互换
  *p=*pmin;
  *pmin=temp;

  pmin=p+1;
    //将 a[0][1]的地址赋给 pmin，从该位置开始找最小的元素
  for (i=0;i<5;i++)                //找第二最小值的地址赋给  pmin
    for (j=0;j<5;j++)
   {if(i==0 && j==0) continue;
     if    (*pmin > *(p+5*i+j)) pmin=p+5*i+j;
   }
  temp=*pmin;                      //将第二最小值与右上角元素
```

互换

```
   *pmin=*(p+4);
   *(p+4)=temp;


   pmin=p+1;
   for (i=0;i<5;i++)            //找第三最小值的地址赋给 pmin
      for (j=0;j<5;j++)
    {if((i==0    && j==0) ||(i==0    && j==4)) continue;
      if(*pmin>*(p+5*i+j)) pmin=p+5*i+j;
    }
   temp=*pmin;                    // 将第三最小值与左下角元素互
```

换

```
   *pmin=*(p+20);
   *(p+20)=temp;


   pmin=p+1;
   for (i=0;i<5;i++)            // 找第四最小值的地址赋给 pmin
       for (j=0;j<5;j++)
    {if ((i==0    && j==0) ||(i==0    && j==4)||(i==4    && j==0))
continue;
       if (*pmin>*(p+5*i+j)) pmin=p+5*i+j;
      }
```

```
   temp=*pmin;                    //将第四最小值与右下角元素互
```
换

```
   *pmin=*(p+24);
   *(p+24)=temp;
   }
```

6.11 题

```
#include <iostream>
using namespace std;
int main()
{void sort(char s[][6]);
  int i;
  char str[10][6];
  cout<<"input 10 strings:"<<endl;
  for (i=0;i<10;i++)
     cin>>str[i];
  sort(str);
  cout<<"Now,the sequence is:"<<endl;
  for (i=0;i<10;i++)
     cout<<str[i]<<endl;
  return 0;
}
```

```
void sort(char s[][6])
{int i,j;
  char *p,temp[10];
  p=temp;
  for (i=0;i<9;i++)
     for (j=0;j<9-i;j++)
        if (strcmp(s[j],s[j+1])>0)
          {strcpy(p,s[j]);
            strcpy(s[j],s[+j+1]);
            strcpy(s[j+1],p);
          }
}
```

6.11 题另一解

```
#include <iostream>
using namespace std;
int main()
{void sort(char (*p)[6]);
  int i;
  char str[10][6];
  char (*p)[6];
  cout<<"input 10 strings:"<<endl;
  for (i=0;i<10;i++)
```

```
    cin>>str[i];
  p=str;
  sort(p);
  cout<<"Now,the sequence is:"<<endl;
  for (i=0;i<10;i++)
     cout<<str[i]<<endl;
  return 0;
}

void sort(char (*s)[6])
{int i,j;
  char temp[6],*t=temp;
  for (i=0;i<9;i++)
     for (j=0;j<9-i;j++)
        if (strcmp(s[j],s[j+1])>0)
          {strcpy(t,s[j]);
            strcpy(s[j],s[+j+1]);
            strcpy(s[j+1],t);
          }
}
```

6.11 题另一解

```
#include <iostream>
```

```
#include <string>
using namespace std;
int main()
{void sort(string *);
  int i;
  string str[10],*p=str;
  cout<<"input 10 strings:"<<endl;
  for (i=0;i<10;i++)
     cin>>str[i];
  sort(p);
  cout<<"Now,the sequence is:"<<endl;
  for (i=0;i<10;i++)
     cout<<str[i]<<endl;
  return 0;
}

void sort(string *s)
{int i,j;
  string temp;
  for (i=0;i<9;i++)
     for (j=0;j<9-i;j++)
        if (s[j]>s[j+1])
```

```
        {temp=s[j];
          s[j]=s[+j+1];
          s[j+1]=temp;
        }
}
```

6.12 题

```
#include <iostream>
using namespace std;
int main()
{void sort(char *[]);
 int i;
 char *p[10],str[10][20];
 for (i=0;i<10;i++)
    p[i]=str[i];            //将第 i 个字符串的首地址赋予指针数组
p 的第 i 个元素
 cout<<"input 10 strings:"<<endl;
 for (i=0;i<10;i++)
    cin>>p[i];
 sort(p);
 cout<<"Now,the sequence is:"<<endl;
 for (i=0;i<10;i++)
    cout<<p[i]<<endl;
```

```
 return 0;
}

void sort(char *s[])
{int i,j;
 char *temp;
 for (i=0;i<9;i++)
    for (j=0;j<9-i;j++)
       if (strcmp(*(s+j),*(s+j+1))>0)
          {temp=*(s+j);
           *(s+j)=*(s+j+1);
           *(s+j+1)=temp;
          }
}
```

6.13 题

```
#include <iostream>
#include <cmath>
using namespace std;
int main()
{float integral(float (*p)(float),float a,float b,int n);
 float a1,b1,a2,b2,a3,b3,c,(*p)(float);
 float fsin(float);                    // 对 fsin 函数作声明
```

```
 float fcos(float);                    // 对 fcos 函数作声明
 float fexp(float);                    // 对 fexp 函数作声明
 int n=20;
 cout<<"input  a1,b1:";                //输入求 sin(x) 定积分的
下限和上限
 cin>>a1>>b1;
 cout<<"input  a2,b2:";                // 输入求 cos(x) 定积分的
下限和上限
 cin>>a2>>b2;
 cout<<"input   a3,b3:";                    //  输 入 求 #include
<iostream>
 cin>>a3>>b3;
 p=fsin;
 c=integral(p,a1,b1,n);                // 求出 sin(x)的定积分
 cout<<"The integral of sin(x) is :"<<c<<endl;
 p=fcos;
 c=integral(p,a2,b2,n);                // 求出 cos(x)的 定积分
 cout<<"The integral of cos(x) is :"<<c<<endl;;
 p=fexp;
 c=integral(p,a3,b3,n);                // 求出 的定积分
 cout<<"The integral of exp(x) is :"<<c<<endl;
 return 0;
```

```
}

float integral(float (*p)(float),float a,float b,int n)
                    //用矩形法求定积分的通用函数
{int i;
 float x,h,s;
 h=(b-a)/n;
 x=a;
 s=0;
 for (i=1;i<=n;i++)
   {x=x+h;
    s=s+(*p)(x)*h;
   }
return(s);
}

float fsin(float x)                          // 计算 sin(x) 的函数
{return sin(x);}

float  fcos(float  x)                          // 计算  cos(x) 的函
数
{return cos(x);}
```

```
float fexp(float x)                          //  计算 exp(x)的函数
{return exp(x);}
```

6.13 题

```
#include <iostream>
#include <cmath>
using namespace std;
int main()
{float integral(float (*p)(float),float a,float b,int n);
 float a1,b1,a2,b2,a3,b3,c,(*p)(float);
 float fsin(float);                    //  对 fsin 函数作声明
 float fcos(float);                    //  对 fcos 函数作声明
 float fexp(float);                    //  对 fexp 函数作声明
 int n=20;
 cout<<"input  a1,b1:";                //输入求 sin(x)  定积分的
下限和上限
 cin>>a1>>b1;
 cout<<"input  a2,b2:";                //  输入求  cos(x)  定积分的
下限和上限
 cin>>a2>>b2;
 cout<<"input   a3,b3:";                    //   输 入 求 #include
<iostream>
```

```
 cin>>a3>>b3;
 p=fsin;
 c=integral(p,a1,b1,n);                  // 求出 sin(x)的定积分
 cout<<"The integral of sin(x) is :"<<c<<endl;
 p=fcos;
 c=integral(p,a2,b2,n);                  // 求出 cos(x)的 定积分
 cout<<"The integral of cos(x) is :"<<c<<endl;;
 p=fexp;
 c=integral(p,a3,b3,n);                  // 求出 的定积分
 cout<<"The integral of exp(x) is :"<<c<<endl;
 return 0;
}

float integral(float (*p)(float),float a,float b,int n)
                //用矩形法求定积分的通用函数
{int i;
 float x,h,s;
 h=(b-a)/n;
 x=a;
 s=0;
 for (i=1;i<=n;i++)
   {x=x+h;
```

```
    s=s+(*p)(x)*h;
  }
return(s);
}

float fsin(float x)                          // 计算 sin(x) 的函数
{return sin(x);}

float fcos(float x)                          // 计算 cos(x) 的函数
{return cos(x);}

float fexp(float x)                          // 计算 exp(x)的函数
{return exp(x);}
```

6.14 题

```
#include <iostream>
using namespace std;
int main()
{ void sort (char *p,int m);
  int i,n;
  char *p,num[20];
```

```
  cout<<"input n:";
  cin>>n;
  cout<<"please input these numbers:"<<endl;
  for (i=0;i<n;i++)
    cin>>num[i];
  p=&num[0];
  sort(p,n);
  cout<<"Now,the sequence is:"<<endl;
  for (i=0;i<n;i++)
      cout<<num[i]<<" ";
  cout<<endl;
  return 0;
}

void sort (char *p,int m)                    // 将 n 个数逆序排
```
列函数
```
{int i;
  char temp, *p1,*p2;
  for (i=0;i<m/2;i++)
  {p1=p+i;
    p2=p+(m-1-i);
    temp=*p1;
```

```
    *p1=*p2;
    *p2=temp;
  }
 }
```

6.15 题

```
#include <iostream>
using namespace std;
int main()
{void avsco(float *,float *);
 void avcour1(char (*)[10],float *);
 void fali2(char course[5][10],int num[],float *pscore,float aver[4]);
 void good(char course[5][10],int num[4],float *pscore,float aver[4]);
 int i,j,*pnum,num[4];
 float score[4][5],aver[4],*pscore,*paver;
 char course[5][10],(*pcourse)[10];
 cout<<"input course:"<<endl;
 pcourse=course;
 for (i=0;i<5;i++)
    cin>>course[i];
```

```
 cout<<"input NO. and scores:"<<endl;
 cout<<"NO.";
 for (i=0;i<5;i++)
    cout<<","<<course[i];
 cout<<endl;
 pscore=&score[0][0];
 pnum=&num[0];
 for (i=0;i<4;i++)
 {cin>>*(pnum+i);
  for (j=0;j<5;j++)
     cin>>*(pscore+5*i+j);
 }
 paver=&aver[0];
 cout<<endl<<endl;
 avsco(pscore,paver);                    // 求出每个学生
的平均成绩
 avcour1(pcourse,pscore);                // 求出第一门
课的平均成绩
 cout<<endl<<endl;
 fali2(pcourse,pnum,pscore,paver);       // 找出两门课
不及格的学生
 cout<<endl<<endl;
```

```
 good(pcourse,pnum,pscore,paver);              // 找出成绩好的学生
 return 0;
}

void avsco(float *pscore,float *paver)   // 求每个学生的平均成绩的函数
 {int i,j;
  float sum,average;
  for (i=0;i<4;i++)
   {sum=0.0;
    for (j=0;j<5;j++)
       sum=sum+(*(pscore+5*i+j));          //累计每个学生的各科成绩
    average=sum/5;                         //计算平均成绩
    *(paver+i)=average;
   }
}

void avcour1(char (*pcourse)[10],float *pscore)          // 求第一课程的平均成
绩的函数
```

```
 {int i;
  float sum,average1;
  sum=0.0;
  for (i=0;i<4;i++)
     sum=sum+(*(pscore+5*i));                    //累计每个学生的得分
  average1=sum/4;                                //计算平均成绩
  cout<<"course 1: "<<*pcourse<<",average score:"<<average1<<endl;
}

void fail2(char course[5][10],int num[],float *pscore,float aver[4])
                  // 找两门以上课程不及格的学生的函数
 {int i,j,k,labe1;
  cout<<"      ==========Student who failed in two courses =======   "<<endl;
  cout<<"NO.     ";
  for (i=0;i<5;i++)
     cout<<course[i]<<"    ";
  cout<<"   average"<<endl;
```

```
   for (i=0;i<4;i++)
   {labe1=0;
    for (j=0;j<5;j++)
       if (*(pscore+5*i+j)<60.0) labe1++;
    if (labe1>=2)
     {cout<<num[i]<<"          ";
       for (k=0;k<5;k++)
          cout<<*(pscore+5*i+k)<<"          ";
       cout<<"      "<<aver[i]<<endl;
     }
   }
}

void good(char course[5][10],int num[4],float *pscore,float aver[4])
    // 找成绩优秀学生(全部课程成绩在 85 分以上或平均成绩在 90 分以上)的函数
 {int i,j,k,n;
   cout<<"              ======Students whose score is good======"<<endl;
   cout<<"NO.     ";
   for (i=0;i<5;i++)
```

```
      cout<<course[i]<<"    ";
   cout<<"    average"<<endl;
   for (i=0;i<4;i++)
    {n=0;
     for (j=0;j<5;j++)
        if (*(pscore+5*i+j)>85.0) n++;
     if ((n==5)||(aver[i]>=90))
      {cout<<num[i]<<"          ";
       for (k=0;k<5;k++)
          cout<<*(pscore+5*i+k)<<"          ";
       cout<<"       "<<aver[i]<<endl;
      }
  }
}
```

6.16 题

```
#include <iostream>
using namespace std;
int main()
{char str[50],*pstr;
 int i,j,k,m,e10,digit,ndigit,a[10],*pa;
```

```
 cout<<"input a string:"<<endl;
gets(str);
cout<<endl;
pstr=&str[0];       //字符指针 pstr 指向数组 str 首元素
pa=&a[0];            //指针 pa 指向 a 数组首元素
ndigit=0;            //ndigit 代表有多少个整数
i=0;                 //i 代表字符串中的第几个字符/
j=0;                 //j 代表连续数字的位数
while(*(pstr+i)!='\0')
 {if((*(pstr+i)>='0') && (*(pstr+i)<='9'))
     j++;
  else
   {if (j>0)
      {digit=*(pstr+i-1)-48;              //将个数位赋予 digit
       k=1;
       while  (k<j)        //将含有两位以上数的其它位的数值累计于 digit
         {e10=1;
          for (m=1;m<=k;m++)
          e10=e10*10;                          //e10 代表该位数所应乘的因子
          digit=digit+(*(pstr+i-1-k)-48)*e10;   //将该位数的数
```

```
值累加于 digit
            k++;                                    //位数 k 自增
          }
         *pa=digit;                                 //将数值放在数组 a 中
         ndigit++;
         pa++;                                      //指针 pa 指向 a 数组
下一元素
         j=0;
        }
    }
  i++;
 }
 if  (j>0)                                          //以数字结尾字符串的最
后一个数据
  {digit=*(pstr+i-1)-48;                 //将个数位赋予 digit
    k=1;
    while  (k<j)                 //  将含有两位以上数的其它位的数值
累加于 digit
     {e10=1;
      for (m=1;m<=k;m++)
         e10=e10*10;                    //e10  代表位数所应乘的因
子
```

```
        digit=digit+(*(pstr+i-1-k)-48)*e10;    //将该位数的数值累加于 digit
        k++;    /*位数 K 自增*/
      }
     *pa=digit;                          //将数值放到数组 a 中
     ndigit++;
     j=0;
   }
   printf("There are %d numbers in this line. They are:\n",ndigit);
   j=0;
   pa=&a[0];
   for (j=0;j<ndigit;j++)                    //打印数据
      cout<<*(pa+j)<<endl;
   cout<<endl;
   return 0;
}
```

6.17 题

```
#include <iostream>
using namespace std;
int main()
```

```
{int strcmp(char *p1,char *p2);
 int m;
 char str1[20],str2[20],*p1,*p2;
 cout<<"input two strings:"<<endl;
 cin>>str1;
 cin>>str2;
 p1=&str1[0];
 p2=&str2[0];
 m=strcmp(p1,p2);
 cout<<"result:"<<m<<endl;
 return 0;
}

int strcmp(char *p1,char *p2)          //自已定义字符串比较函数
{int i;
 i=0;
 while(*(p1+i)==*(p2+i))
    if (*(p1+i++)=='\0') return(0);      //全部字符相同时返回结果 0
 return(*(p1+i)-*(p2+i));      //不相同时返回结果为第一对不相同字符的 ASCII 码
```

的差值

}

6.18 题

```
#include <iostream>
using namespace std;
int main()
{char *month_name[13]={"illegal
month","January","February","March","April",

"May","June","July","August","September","October",
"November","December"};
int n;
cout<<"input month:"<<endl;
cin>>n;
if ((n<=12) && (n>=1))
    cout<<"It is "<<*(month_name+n)<<endl;
else
   cout<<"It is wrong"<<endl;
return 0;
}
```

6.19 题

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

int main()
{void sort(char **p);
 const int m=20;            //定义字符串的最大长度
 int i;
 char **p,*pstr[5],str[5][m];
 for (i=0;i<5;i++)
    pstr[i]=str[i];     /*将第 i 个字符串的首地址赋予指针数组
pstr 的第 i 个元素*/
 cout<<"input 5 strings:"<<endl;
 for (i=0;i<5;i++)
     cin>>pstr[i];
 p=pstr;
 sort(p);
 cout<<"strings sorted:"<<endl;
 for (i=0;i<5;i++)
     cout<<pstr[i]<<endl;
 return 0;
}
```

```
void sort(char **p)                    //冒泡法对 5 个字符串排序函数
{int i,j;
  char *temp;
  for (i=0;i<5;i++)
    {for (j=i+1;j<5;j++)
       {if  (strcmp(*(p+i),*(p+j))>0)          //比较后交换字符串地址
          {temp=*(p+i);
            *(p+i)=*(p+j);
            *(p+j)=temp;
          }
        }
    }
}
```

6.20 题

```
#include <iostream>
using namespace std;
int main()
{void sort(int **p,int n);
  int i,n,data[10],**p,*pstr[10];
```

```
 cout<<"input n:";
 cin>>n;
 for (i=0;i<n;i++)
    pstr[i]=&data[i];     /*将第 i 个整数的地址赋予指针数组
pstr 的第 i 个元素*/
 cout<<"input "<<n<<" integer numbers:"<<endl;
 for (i=0;i<n;i++)
    cin>>*pstr[i];
 p=pstr;
 sort(p,n);
 cout<<"Now,the sequence is:"<<endl;
 for (i=0;i<n;i++)
    cout<<*pstr[i]<<"   ";
 cout<<endl;
 return 0;
}

void sort(int **p,int n)
{int i,j,*temp;
 for (i=0;i<n-1;i++)
   {for (j=i+1;j<n;j++)
       {if (**(p+i)>**(p+j))          //比较后交换整数地址
```

```
            {temp=*(p+i);
             *(p+i)=*(p+j);
             *(p+j)=temp;
            }
```

7.1 题

```
#include <iostream>
using namespace std;
struct
    { int year;
       int month;
       int day;
    }date;
int main()
 {int days;
   cout<<"input year,month,day:";
   cin>>date.year>>date.month>>date.day;
   switch(date.month)
   { case 1: days=date.day;          break;
      case 2: days=date.day+31;     break;
      case 3: days=date.day+59;     break;
      case 4: days=date.day+90;     break;
      case 5: days=date.day+120;    break;
```

```
        case 6: days=date.day+151;    break;
        case 7: days=date.day+181;    break;
        case 8: days=date.day+212;    break;
        case 9: days=date.day+243;    break;
        case 10: days=date.day+273; break;
        case 11: days=date.day+304; break;
        case 12: days=date.day+334; break;
    }
    if ((date.year %4== 0 && date.year % 100 != 0
            ||date.year % 400 == 0) && date.month >=3)
                days+=1;
    cout<<date.month<<"/"<<date.day<<" is the "<<days
        <<"th day in "<<date.year<<"."<<endl;
    return 0;
}
```

7.1 题另一解

```
#include <iostream>
using namespace std;
struct
        {int year;
        int month;
```

```
        int day;
      }date;
 int main()
      {int i,days;
        int
day_tab[13]={0,31,28,31,30,31,30,31,31,30,31,30,31};
        cout<<"input year,month,day:";
        cin>>date.year>>date.month>>date.day;
        days=0;
        for (i=1;i<date.month;i++)
           days+=day_tab[i];
        days+=date.day;
        if    ((date.year%4==0    &&    date.year%100!=0    ||
date.year%400==0) &&
date.month>=3)
           days+=1;
        cout<<date.month<<"/"<<date.day<<" is the "<<days
         <<"th day in "<<date.year<<"."<<endl;
      return 0;
}
```

7.2 题

```
#include <iostream>
using namespace std;
struct y_m_d
        {int year;
        int month;
        int day;
       };
 int main()
 {y_m_d date;
   int days(int,int,int);                    /* 对 days 函数的声明 */
   int day_sum;
   cout<<"input year,month,day:";
   cin>>date.year>>date.month>>date.day;
   day_sum=days(date.year,date.month,date.day);
   cout<<date.month<<"/"<<date.day<<"  is  the "<<day_sum
        <<"th day in "<<date.year<<endl;
   return 0;
   }

int days(int year,int month,int day)          /* 定义 days 函
```

```
数 */
{int day_sum,i;
 int
day_tab[13]={0,31,28,31,30,31,30,31,31,30,31,30,31};
 day_sum=0;
 for (i=1;i<month;i++)
    day_sum+=day_tab[i];
 day_sum+=day;
 if  ((year%4==0  &&  year%100!=0  ||  year%4==0)  &&
month>=3)
       day_sum+=1;
 return(day_sum);
}
```

7.3 题

```
#include <iostream>
#include <iomanip>
using namespace std;
const int n=5;
struct student
{ char num[6];
   char name[8];
```

```
   int score[4];
}stu[n];
int main()
{void print(student stu[6]);
 int i,j;
 for (i=0;i<n;i++)
 {cout<<"input scores of student "<<i+1<<":"<<endl;
   cout<<"NO.: ";
   cin>>stu[i].num;
   cout<<"name: ";
   cin>>stu[i].name;
   for (j=0;j<3;j++)
      {cout<<"score "<<j+1<<":";
        cin>>stu[i].score[j];
      }
   cout<<endl;
 }
print(stu);
return 0;
}

void print(student stu[6])
```

```
 {int i,j;
   cout<<"   NO.          name          score1      score2
score3"<<endl;
   for (i=0;i<n;i++)
    {cout<<stu[i].num<<"      "<<setw(10)<<stu[i].name<<"
";
      for (j=0;j<3;j++)
         cout<<setw(3)<<stu[i].score[j]<<"          ";
      cout<<endl;
    }
 }
```

7.4 题

```
#include <iostream>
#include <iomanip>
using namespace std;
const int n=5;
struct student
{ char num[6];
   char name[8];
   int score[4];
}stu[n];
```

```
int main()
{void input(student stu[]);
  void print(student stu[]);
  input(stu);
  print(stu);
  return 0;
}

void input(student stu[])
{int i,j;
  for (i=0;i<n;i++)
  {cout<<"input scores of student "<<i+1<<":"<<endl;
    cout<<"NO.: ";
    cin>>stu[i].num;
    cout<<"name: ";
    cin>>stu[i].name;
    for (j=0;j<3;j++)
       {cout<<"score "<<j+1<<":";
         cin>>stu[i].score[j];
       }
    }
}
```

```
 void print(student stu[])
 {int i,j;
   cout<<"   NO.          name          score1      score2
score3"<<endl;
   for (i=0;i<n;i++)
    {cout<<stu[i].num<<"      "<<setw(10)<<stu[i].name<<"
";
      for (j=0;j<3;j++)
         cout<<setw(3)<<stu[i].score[j]<<"          ";
      cout<<endl;
    }
 }
```

7.5 题

```
#include <iostream>
#include <iomanip>
using namespace std;
const int n=10;
struct student
{ char num[6];
   char name[8];
   int score[4];
```

```
    float avr;
} stu[n];

int main()
{ int i,j,max,maxi,sum;
    float average;
    for (i=0;i<n;i++)
       {cout<<"input scores of student "<<i+1<<endl;;
        cout<<"NO.:";
        cin>>stu[i].num;
        cout<<"name:";
        cin>>stu[i].name;
        for (j=0;j<3;j++)
           {cout<<"score "<<j+1<<":";
            cin>>stu[i].score[j];
           }
       cout<<endl;
       }
    average=0;
    max=0;
    maxi=0;
    for (i=0;i<n;i++)
```

```
      {sum=0;
       for (j=0;j<3;j++)
          sum+=stu[i].score[j];
       stu[i].avr=sum/3.0;
       average+=stu[i].avr;
       if (sum>max)
        {max=sum;
          maxi=i;
        }
      }
   average/=n;
   cout<<"        NO.          name         score1       score2
score3
average"<<endl;
   for (i=0;i<n;i++)
      {cout<<setw(8)<<stu[i].num<<"
"<<setw(10)<<stu[i].name<<"           ";
       for (j=0;j<3;j++)
          cout<<setw(3)<<stu[i].score[j]<<"           ";
       cout<<stu[i].avr<<endl;
      }
      cout<<"average="<<average<<endl;
```

```
      cout<<"The highest score is :"<<stu[maxi].name<<",
score
total:"<<max<<endl;
   return 0;
 }
```

7.6 题

```
#include <iostream>
using namespace std;
#define NULL 0
struct student
{long num;
 float score;
 struct student *next;
};
int main()
 {student a,b,c,*head,*p;
   a.num=10001; a.score=89.5;
   b.num=10003; b.score=90;
   c.num=10007;  c.score=85;        //为结点的 num 和 score
成员赋值
   head=&a;                          //将结点 a 的起始地址赋
```

给头指针 head

a.next=&b; //将结点 b 的起始地址赋给 a 结点的 next 成员

b.next=&c; //将结点 c 的起始地址赋给 b 结点的 next 成员

c.next=NULL; //c 结点的 next 成员不存放其他结点地址

p=head; //使 p 指针指向 a 结点

do

{cout<<p->num<<" "<<p->score<<endl; //输出 p 指向的结点的数据

p=p->next; //使 p 指向下一结点

}while(p!=NULL); //输出完 c 结点后 p 的值为 NULL

return 0;

}

7.6 题另一解

```
#include <iostream>
using namespace std;
#define NULL 0
```

```
struct student
{long num;
 float score;
 student *next;
};
                                    //定义 n 为全局变量，本文件模块中各函数均可使用它
student *creat(void)          //定义函数。此函数带回一个指向链表头的指针
{student *head;
 student *p1,*p2;
 int n=0;
 p1=p2=new  student;              //开辟一个新单元，并使 p1,p2 指向它
cin>>p1->num>>p1->score;
head=NULL;
while(p1->num!=0)
{n=n+1;
 if(n==1) head=p1;
 else p2->next=p1;
 p2=p1;
 p1=new student;
```

```
  cin>>p1->num>>p1->score;
}
p2->next=NULL;
return(head);
}
```

7.7 题

```
#include <iostream>
using namespace std;
#define NULL 0
struct student
{long num;
  float score;
  student *next;
};
int n;
void print(student *head)
  {student *p;
    cout<<"Now，These "<<n<<" records are："<<endl;
    p=head;
    if(head!=NULL)
```

```
   do
      {cout<<p->num<<"    "<<p->score<<endl;
        p=p->next;
    }while(p!=NULL);
}
```

7.7 题另一解

```
#include <iostream>
using namespace std;
#define NULL 0
struct student
{long num;
 float score;
 student *next;
};
int n;
student *del(student *head,long num)
{student *p1,*p2;
 if (head==NULL)                          //是空表
 {cout<<"list null!"<<endl; return(head);}
 p1=head;                                 //使 p1 指向第一个结
```

点

```
 while(num!=p1->num && p1->next!=NULL) //p1 指向的不是所要找的结点且后面还有
结点
 {p2=p1; p1=p1->next;}                    //p1 后移一个结点
 if(num==p1->num)                         //找到了
 {if(p1==head) head=p1->next;     //若 p1 指向的是首结点，把第二个结点地址赋予
head
   else  p2->next=p1->next;       //否则将下一结点地址赋给前一结点地址
   cout<<"delete:"<<num<<endl;
   n=n+1;
 }
 else cout<<"cannot find "<<num;        //找不到该结点
 return(head);
}
```

7.8 题

```
#include <iostream>
using namespace std;
#define NULL 0
struct student
```

```
{long num;
 float score;
 student *next;
};
int n;
student *del(student *head,long num)
{student *p1,*p2;
 if (head==NULL)                          //是空表
{cout<<"list null!"<<endl; return(head);}
    p1=head;                              //使 p1 指向第一个
结点
    while(num!=p1->num && p1->next!=NULL) //p1 指向的
不是所要找的结点且后面
还有结点
{p2=p1; p1=p1->next;}                     //p1 后移一个结点
if(num==p1->num)                          //找到了
{if(p1==head) head=p1->next;     //若 p1 指向的是首结点，把
第二个结点地址赋予
head
 else p2->next=p1->next;       //否则将下一结点地址赋给前一
结点地址
 cout<<"delete:"<<num<<endl;
```

```
n=n-1;
}
else cout<<"cannot find "<<num;        //找不到该结点
return(head);
}
```

7.9 题

```
#include <iostream>
using namespace std;
#define NULL 0
struct student
{long num;
 float score;
   student*next;
};
int n;

student *insert(student *head,student *stud)
{student *p0,*p1,*p2;
 p1=head;                                    //使 p1 指向第一个结点
 p0=stud;                                    //指向要插入的结点
```

```
 if(head==NULL)                          //原来的链表是空表
 {head=p0;p0->next=NULL;}                //使 p0 指向的结点作为头结点
 else
 {while((p0->num>p1->num) && (p1->next!=NULL))
 {p2=p1;                                 //使 p2 指向刚才 p1 指向的结点
  p1=p1->next;}                          //p1 后移一个结点
  if(p0->num<=p1->num)
  {if(head==p1)  head=p0;                //插到原来第一个结点之前
   else p2->next=p0;                     //插到 p2 指向的结点之后
   p0->next=p1;}
  else
  {p1->next=p0; p0->next=NULL;}}   //插到最后的结点之后
   n=n+1;                                 //结点数加 1
   return (head);
}
```

7.10 题

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

```
#define NULL 0
struct student
{long num;
 float score;
 student *next;
};
int n;

int main()
{ student *creat(void);
   student *del(student *,long);
   student *insert(student *,student *);
   void print(student *);
   student *head,stu;
   long del_num;
   cout<<"input records:"<<endl;
   head=creat();                                  //返回头指针
   print(head);                                   //输出全部结点
   cout<<endl<<"input the deleted number:";
   cin>>del_num;                                  //输入要删除的学
号
   head=del(head,del_num);                        //删除后链表的
```

```
头地址
   print(head);                                    //输出全部结点
   cout<<endl<<"input the inserted record:";  //输入要插入的结点
   cin>>stu.num>>stu.score;
   head=insert(head,&stu);                        //返回地址
   print(head);                                    //输出全部结点
   cout<<endl<<"input the inserted record:";  //输入要插入的结点
   cin>>stu.num>>stu.score;
   head=insert(head,&stu);                        //返回地址
   print(head);
   return 0;
}

student *creat(void)          //建立链表的函数
{student *head;
 student *p1,*p2;
 n=0;
 p1=p2=new  student;          //开辟一个新单元，并使 p1,p2 指向它
 cin>>p1->num>>p1->score;
```

```
 head=NULL;
 while(p1->num!=0)
{n=n+1;
 if(n==1) head=p1;
 else p2->next=p1;
 p2=p1;
 p1=new student;
 cin>>p1->num>>p1->score;
}
p2->next=NULL;
return(head);
}

student *del(student *head,long num)     //删除结的函数
{student *p1,*p2;
 if (head==NULL)                          //是空表
 {cout<<"list null!"<<endl; return(head);}
 p1=head;                                 //使 p1 指向第一个结点
 while(num!=p1->num && p1->next!=NULL) //p1 指向的不是所要找的结点且后面还有
结点
```

```
 {p2=p1; p1=p1->next;}                          //p1 后移一个结点
 if(num==p1->num)                               //找到了
 {if(p1==head) head=p1->next;     //若 p1 指向的是首结点，把第二个结点地址赋予
head
   else  p2->next=p1->next;       //否则将下一结点地址赋给前一结点地址
   cout<<"delete:"<<num<<endl;
   n=n-1;
 }
 else cout<<"cannot find "<<num;        //找不到该结点
 return(head);
}

student *insert(student *head,student *stud)   //插入结点的函数
{student *p0,*p1,*p2;
 p1=head;                                       //使 p 1 指向第一个结点
 p0=stud;                                      //指向要插入的结点
 if(head==NULL)                                 //原来的链表是空表
 {head=p0;p0->next=NULL;}                       //使 p 0 指向的结点
```

作为头结点

```
 else
 {while((p0->num>p1->num) && (p1->next!=NULL))
 {p2=p1;                                    //使 p 2 指向刚才 p 1 指向
```

的结点

```
   p1=p1->next;}                            //p1 后移一个结点
   if(p0->num<=p1->num)
   {if(head==p1)  head=p0;                  //插到原来第一个结点之
```

前

```
    else p2->next=p0;                       //插到 p2 指向的结点之后*
```

/

```
    p0->next=p1;}
   else
   {p1->next=p0; p0->next=NULL;}}   //插到最后的结点之后
    n=n+1;                                  //结点数加 1
    return (head);
}

void print(student *head)                   //输出链表的函数
 {student *p;
   cout<<"Now，These "<<n<<" records are："<<endl;
   p=head;
```

```
   if(head!=NULL)
   do
      {cout<<p->num<<"    "<<p->score<<endl;
        p=p->next;
    }while(p!=NULL);
}
```

7.10 题另一解

```
#include <iostream>
using namespace std;
#define NULL 0
struct student
{long num;
 float score;
 student *next;
};
int n;

int main()
{ student *creat(void);
   student *del(student *,long);
   student *insert(student *,student *);
```

```
   void print(student *);
   student *head,*stu;
   long del_num;
   cout<<"input records:"<<endl;
   head=creat();                                    //返回头指针
   print(head);                                     //输出全部结点
   cout<<endl<<"input the deleted number:";
   cin>>del_num;                                    //输入要删除的学
号
   while(del_num!=0)
   {head=del(head,del_num);                         //删除后链表的
头地址
    print(head);                                    //输出全部结点
    cout<<"input the deleted number:";
    cin>>del_num;
   }
   cout<<endl<<"input the inserted record:";   //输入要插
入的结点
   stu=new  student;                                //开辟一个新结
点
   cin>>stu->num>>stu->score;
   while(stu->num!=0)
```

```
   {head=insert(head,stu);                    //返回地址
    print(head);                              //输出全部结点
    cout<<endl<<"input the inserted record:";  //输入要插入的结点
    stu=new student;
    cin>>stu->num>>stu->score;
   }
   return 0;
}

student *creat(void)          //建立链表的函数
{student *head;
 student *p1,*p2;
 n=0;
 p1=p2=new  student;          //开辟一个新单元，并使 p1,p2 指向它
 cin>>p1->num>>p1->score;
 head=NULL;
 while(p1->num!=0)
{n=n+1;
 if(n==1) head=p1;
 else p2->next=p1;
```

```
  p2=p1;
  p1=new student;
  cin>>p1->num>>p1->score;
}
p2->next=NULL;
return(head);
}

student *del(student *head,long num)     //删除结点的函数
{student *p1,*p2;
  if (head==NULL)                          //是空表
  {cout<<"list null!"<<endl; return(head);}
  p1=head;                                 //使 p1 指向第一个结点
  while(num!=p1->num  &&  p1->next!=NULL) //p1 指向的不是所要找的结点且后面还有
结点
  {p2=p1; p1=p1->next;}                    //p1 后移一个结点
  if(num==p1->num)                           //找到了
  {if(p1==head) head=p1->next;     //若 p1 指向的是首结点，把第二个结点地址赋予
head
```

```
   else  p2->next=p1->next;       //否则将下一结点地址赋给前一结点地址
   cout<<"delete:"<<num<<endl;
   n=n-1;
  }
  else cout<<"cannot find "<<num;        //找不到该结点
  return(head);
}

student  *insert(student  *head,student  *stud)   //插入结点的函数
{student *p0,*p1,*p2;
  p1=head;                                  //使 p1 指向第一个结点
  p0=stud;                                  //指向要插入的结点
  if(head==NULL)                            //原来的链表是空表
  {head=p0;p0->next=NULL;}                  //使 p0 指向的结点作为头结点
  else
  {while((p0->num>p1->num) && (p1->next!=NULL))
  {p2=p1;                                   //使 p2 指向刚才 p1 指向的结点
```

```
    p1=p1->next;}                          //p1 后移一个结点
    if(p0->num<=p1->num)
    {if(head==p1)  head=p0;                //插到原来第一个结点之
前
     else p2->next=p0;                     //插到 p2 指向的结点之后
     p0->next=p1;}
    else
    {p1->next=p0; p0->next=NULL;}    //插到最后的结点之后
     n=n+1;                                //结点数加 1
     return (head);
}

void print(student *head)                  //输出链表的函数
  {student *p;
    cout<<"Now，These "<<n<<" records are："<<endl;
    p=head;
    if(head!=NULL)
    do
       {cout<<p->num<<"    "<<p->score<<endl;
         p=p->next;
     }while(p!=NULL);
}
```

8.1 题

```
#include <iostream>
using namespace std;
class Time
 {public:                          //成员改为公用的
      int hour;
      int minute;
      int sec;
   };
Time t;
void set_time(void)               //在 main 函数之前定义
 {
   cin>>t.hour;
   cin>>t.minute;
   cin>>t.sec;
 }

void show_time(void)              //在 main 函数之前定义
 {
   cout<<t.hour<<":"<<t.minute<<":"<<t.sec<<endl;
 }
```

```
int main()
{set_time();
  show_time();
  return 0;
}
```

8.2 题

```
#include <iostream>
using namespace std;
class Time
   {public:
      void set_time(void)
        {cin>>hour;
          cin>>minute;
          cin>>sec;
        }
      void show_time(void)
        {cout<<hour<<":"<<minute<<":"<<sec<<endl;}

    private: int hour;
```

```
        int minute;
        int sec;
   };

Time t;
int main()
 {
   t.set_time();
   t.show_time();
   return 0;
 }
```

8.3 题

```
#include <iostream>
using namespace std;
class Time
   {public:
      void set_time(void);
      void show_time(void);
    private:
      int hour;
      int minute;
```

```
    int sec;
  };

void Time::set_time(void)
  {cin>>hour;
   cin>>minute;
   cin>>sec;
  }

void Time::show_time(void)
{cout<<hour<<":"<<minute<<":"<<sec<<endl;}

Time t;
int main()
{ t.set_time();
  t.show_time();
  return 0;
}
```

8.4 题

```
//xt8-4.h(student.h)
class Student
```

```
{ public:
       void display( );
     void set_value();
   private:
       int num;
       char name[20];
       char sex ;
   };
```

8.4 题

```
//xt8-4-1.cpp(main.cpp)
#include <iostream>
using namespace std;
#include "xt8-4.h"
int main()
{Student stud;
  stud.set_value();
  stud.display();
  return 0;
}
```

8.4 题另一解

```
//xt8-4-2.cpp(即 student.cpp)
```

```
#include  "xt8-4.h"                                    //在此文件中进行
```
函数的定义

```
#include <iostream>
using namespace std;                                  //不要漏写此行
void Student::display( )
{ cout<<"num:"<<num<<endl;
   cout<<"name:"<<name<<endl;
   cout<<"sex:"<<sex<<endl;
}

void Student::set_value()
{ cin>>num;
   cin>>name;
   cin>>sex;
}
```

8.5 题

```
//xt8-5.h(arraymax.h)
class Array_max
{public:
     void set_value();
     void max_value();
```

```
    void show_value();
  private:
    int array[10];
    int max;
};
```

8.5 题

```
//xt8-5-1.cpp(file1.cpp)
#include <iostream>
#include "xt8-5.h"
int main()
 {Array_max   arrmax;
   arrmax.set_value();
   arrmax.max_value();
   arrmax.show_value();
   return 0;
 }
```

8.5 题

```
//xt8-5-2.cpp(arraymax.cpp)
#include <iostream>
using namespace std;
#include "xt8-5.h"
```

```
void Array_max::set_value()
 { int i;
    for (i=0;i<10;i++)
       cin>>array[i];
 }

void Array_max::max_value()
 {int i;
  max=array[0];
  for (i=1;i<10;i++)
    if(array[i]>max) max=array[i];
  }

void Array_max::show_value()
 {cout<<"max="<<max<<endl;
 }
```

8.6 题

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

```
    void get_value();
    float volume();
    void display();
  public:
    float lengh;
    float width;
    float height;
    };

void Box::get_value()
{ cout<<"please input lengh, width,height:";
    cin>>lengh;
    cin>>width;
    cin>>height;
}

float Box::volume()
{ return(lengh*width*height);}

void Box::display()
{ cout<<volume()<<endl;}
```

```
int main()
{Box box1,box2,box3;
  box1.get_value();
  cout<<"volmue of bax1 is ";
  box1.display();
  box2.get_value();
  cout<<"volmue of bax2 is ";
  box2.display();
  box3.get_value();
  cout<<"volmue of bax3 is ";
  box3.display();
  return 0;
}
```

8.6 题另一解

```
#include <iostream>
using namespace std;
class Box
{public:
   void get_value();
   void volume();
   void display();
```

```
  public:
    float lengh;
    float width;
    float height;
    float vol;
    };

void Box::get_value()
{ cout<<"please input lengh, width,height:";
    cin>>lengh;
    cin>>width;
    cin>>height;
}

void Box::volume()
{ vol=lengh*width*height;}

void Box::display()
{ cout<<vol<<endl;}

int main()
{Box box1,box2,box3;
```

```
 box1.get_value();
 box1.volume();
 cout<<"volmue of bax1 is ";
 box1.display();
 box2.get_value();
 box2.volume();
 cout<<"volmue of bax2 is ";
 box2.display();
 box3.get_value();
 box3.volume();
 cout<<"volmue of bax3 is ";
 box3.display();
 return 0;
}
```

9.2 题

```
#include <iostream>
using namespace std;
class Date
 {public:
    Date(int,int,int);
    Date(int,int);
```

```
    Date(int);
    Date();
    void display();
  private:
    int month;
    int day;
    int year;
};

Date::Date(int m,int d,int y):month(m),day(d),year(y)
{ }

Date::Date(int m,int d):month(m),day(d)
{year=2005;}

Date::Date(int m):month(m)
{day=1;
  year=2005;
}

Date::Date()
{month=1;
```

```
   day=1;
   year=2005;
  }

void Date::display()
 {cout<<month<<"/"<<day<<"/"<<year<<endl;}

int main()
{
 Date d1(10,13,2005);
 Date d2(12,30);
 Date d3(10);
 Date d4;
 d1.display();
 d2.display();
 d3.display();
 d4.display();
 return 0;
 }
```

9.3 题

```
#include <iostream>
```

```
using namespace std;
class Date
 {public:
    Date(int=1,int=1,int=2005);
    void display();
   private:
    int month;
    int day;
    int year;
 };

Date::Date(int m,int d,int y):month(m),day(d),year(y)
 { }

void Date::display()
 {cout<<month<<"/"<<day<<"/"<<year<<endl;}

int main()
{
 Date d1(10,13,2005);
 Date d2(12,30);
 Date d3(10);
```

```
  Date d4;
  d1.display();
  d2.display();
  d3.display();
  d4.display();
  return 0;
}
```

9.4 题

```
#include <iostream>
using namespace std;
class Student
  {public:
     Student(int n,float s):num(n),score(s){}
     void display();
   private:
     int num;
     float score;
  };

void Student::display()
```

```
 {cout<<num<<" "<<score<<endl;}

int main()
{Student stud[5]={

Student(101,78.5),Student(102,85.5),Student(103,98.5),
   Student(104,100.0),Student(105,95.5)};
 Student *p=stud;
 for(int i=0;i<=2;p=p+2,i++)
   p->display();
 return 0;
 }
```

9.5 题

```
#include <iostream>
using namespace std;
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    int num;
    float score;
```

```
 };

void main()
{Student stud[5]={

Student(101,78.5),Student(102,85.5),Student(103,98.5),
   Student(104,100.0),Student(105,95.5)};
 void max(Student* );
 Student *p=&stud[0];
 max(p);
 }

void max(Student *arr)
{float max_score=arr[0].score;
 int k=0;
 for(int i=1;i<5;i++)
    if(arr[i].score>max_score)
{max_score=arr[i].score;k=i;}
 cout<<arr[k].num<<" "<<max_score<<endl;
}
```

9.6 题

```
#include <iostream>
using namespace std;
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    void change(int n,float s) {num=n;score=s;}
    void display(){cout<<num<<" "<<score<<endl;}
   private:
    int num;
    float score;
 };

int main()
{Student stud(101,78.5);
 stud.display();
 stud.change(101,80.5);
 stud.display();
 return 0;
}
```

9.7 题

```
#include <iostream>
```

```
using namespace std;
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    void change(int n,float s) {num=n;score=s;}
    void display() {cout<<num<<" "<<score<<endl;}
       // 可 改 为 :void  display()  const  {cout<<num<<"
"<<score<<endl;}
   private:
    int num;
    float score;
 };

int main()
{const Student stud(101,78.5);
 stud.display();
 //stud.change(101,80.5);
 stud.display();
 return 0;
}
```

9.7 题另一解

```
#include <iostream>
using namespace std;
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    void change(int n,float s) const    {num=n;score=s;}
    void display() const {cout<<num<<" "<<score<<endl;}
   private:
    mutable int num;
    mutable float score;
 };

int main()
{const Student stud(101,78.5);
 stud.display();
 stud.change(101,80.5);
 stud.display();
 return 0;
}
```

9.7 题另一解

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

```
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    void change(int n,float s) {num=n;score=s;}
    void display() {cout<<num<<" "<<score<<endl;}
  private:
    int num;
    float score;
 };

int main()
{Student stud(101,78.5);
 Student *p=&stud;
 p->display();
 p->change(101,80.5);
 p->display();
 return 0;
}
```

9.7 题另一解 A

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

```
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    void change(int n,float s) {num=n;score=s;}
    void display() {cout<<num<<" "<<score<<endl;}
  private:
    mutable int num;
    mutable float score;
 };

int main()
{Student stud(101,78.5);
 const Student *p=&stud;
 p->display();
 p->change(101,80.5);
 p->display();
 return 0;
}
```

9.7 题另一解 B

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

```
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    void change(int n,float s) {num=n;score=s;}
    void display() const{cout<<num<<" "<<score<<endl;}
  private:
    int num;
    float score;
 };

int main()
{Student stud(101,78.5);
 const Student *p=&stud;
 p->display();
 stud.change(101,80.5);
 p->display();
 return 0;
}
```

9.7 题另一解

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

```
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    void change(int n,float s) {num=n;score=s;}
    void display() {cout<<num<<" "<<score<<endl;}
  private:
    int num;
    float score;
 };

int main()
{Student stud(101,78.5);
 Student * const p=&stud;
 p->display();
 p->change(101,80.5);
 p->display();
 return 0;
}
```

9.8 题

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

```
class Student
 {public:
    Student(int n,float s):num(n),score(s){}
    void change(int n,float s) {num=n;score=s;}
    void display() {cout<<num<<" "<<score<<endl;}
   private:
    int num;
    float score;
 };

int main()
{Student stud(101,78.5);
 void fun(Student&);
 fun(stud);
 return 0;
}

void fun(Student &stu)
{stu.display();
 stu.change(101,80.5);
 stu.display();
}
```

9.9 题

```
#include <iostream>
using namespace std;
class Product
 {public:
    Product(int n,int q,float p):num(n),quantity(q),price(p){};
    void total();
    static float average();
    static void display();

  private:
    int num;
    int quantity;
    float price;
    static float discount;
    static float sum;
    static int n;
 };

void Product::total()
```

```
 {float rate=1.0;
  if(quantity>10) rate=0.98*rate;
  sum=sum+quantity*price*rate*(1-discount);
  n=n+quantity;
 }

void Product::display()
 {cout<<sum<<endl;
  cout<<average()<<endl;
 }

float Product::average()
 {return(sum/n);}



float Product::discount=0.05;
float Product::sum=0;
int Product::n=0;

int main()
 {
    Product Prod[3]={
```

```
Product(101,5,23.5),Product(102,12,24.56),Product(103,
100,21.5)
      };
    for(int i=0;i<3;i++)
       Prod[i].total();
    Product::display();
    return 0;
 }
```

9.10 题

```
#include <iostream>
using namespace std;
class Date;
class Time
 {public:
    Time(int,int,int);
    friend void display(const Date &,const Time &);
  private:
    int hour;
    int minute;
    int sec;
```

```
 };

 Time::Time(int h,int m,int s)
 {hour=h;
  minute=m;
  sec=s;
 }

class Date
 {public:
    Date(int,int,int);
    friend void display(const Date &,const Time &);
  private:
    int month;
    int day;
    int year;
 };

Date::Date(int m,int d,int y)
 {month=m;
  day=d;
  year=y;
```

```
 }

void display(const Date &d,const Time &t)
 {
   cout<<d.month<<"/"<<d.day<<"/"<<d.year<<endl;
   cout<<t.hour<<":"<<t.minute<<":"<<t.sec<<endl;
 }


int main()
{
  Time t1(10,13,56);
  Date d1(12,25,2004);
  display(d1,t1);
  return 0;
}
```

9.11 题

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

```
class Date
 {public:
    Date(int,int,int);
    friend Time;
   private:
    int month;
    int day;
    int year;
 };

Date::Date(int m,int d,int y):month(m),day(d),year(y){ }

class Time
 {public:
    Time(int,int,int);
    void display(const Date &);
   private:
    int hour;
    int minute;
    int sec;
 };
```

```
Time::Time(int h,int m,int s):hour(h),minute(m),sec(s){ }

void Time::display(const Date &d)
 {
   cout<<d.month<<"/"<<d.day<<"/"<<d.year<<endl;
   cout<<hour<<":"<<minute<<":"<<sec<<endl;
 }


int main()
{
  Time t1(10,13,56);
  Date d1(12,25,2004);
  t1.display(d1);
  return 0;
}
```

9.12 题

```
#include <iostream>
using namespace std;
template<class numtype>
```

```
class Compare
 {public:
    Compare(numtype a,numtype b);
    numtype max();
    numtype min();
   private:
    numtype x,y;
 };
template <class numtype>
Compare<numtype>::Compare(numtype a,numtype b)
   {x=a;y=b;}
template <class numtype>
numtype Compare<numtype>::max()
 {return (x>y)?x:y;}
template <class numtype>
numtype Compare<numtype>::min()
   {return (x<y)?x:y;}

int main()
{Compare<int> cmp1(3,7);
 cout<<cmp1.max()<<" is the Maximum of two integer
numbers."<<endl;
```

```
 cout<<cmp1.min()<<" is the Minimum of two integer numbers."<<endl<<endl;
 Compare<float> cmp2(45.78,93.6);
 cout<<cmp2.max()<<" is the Maximum of two float numbers."<<endl;
 cout<<cmp2.min()<<" is the Minimum of two float numbers."<<endl<<endl;
 Compare<char> cmp3('a','A');
 cout<<cmp3.max()<<" is the Maximum of two characters."<<endl;
 cout<<cmp3.min()<<" is the Minimum of two characters."<<endl;
 return 0;
}
```

10.1 题

```
#include <iostream>
using namespace std;
class Complex
 {public:
    Complex(){real=0;imag=0;}
    Complex(double r,double i){real=r;imag=i;}
```

```
    double get_real();
    double get_imag();
    void display();
  private:
    double real;
    double imag;
 };

double Complex::get_real()
{return real;}

double Complex::get_imag()
{return imag;}

void Complex::display()
{cout<<"("<<real<<","<<imag<<"i)"<<endl;}

Complex operator + (Complex &c1,Complex &c2)
{
 return
Complex(c1.get_real()+c2.get_real(),c1.get_imag()+c2.ge
t_imag());
```

```
}

int main()
{Complex c1(3,4),c2(5,-10),c3;
  c3=c1+c2;
  cout<<"c3=";
  c3.display();
  return 0;
}
```

10.2 题

```
#include <iostream>
using namespace std;
class Complex
 {public:
    Complex(){real=0;imag=0;}
    Complex(double r,double i){real=r;imag=i;}
    Complex operator+(Complex &c2);
    Complex operator-(Complex &c2);
    Complex operator*(Complex &c2);
    Complex operator/(Complex &c2);
    void display();
```

```
  private:
    double real;
    double imag;
};

Complex Complex::operator+(Complex &c2)
{Complex c;
 c.real=real+c2.real;
 c.imag=imag+c2.imag;
 return c;}

Complex Complex::operator-(Complex &c2)
{Complex c;
 c.real=real-c2.real;
 c.imag=imag-c2.imag;
 return c;}

Complex Complex::operator*(Complex &c2)
{Complex c;
 c.real=real*c2.real-imag*c2.imag;
 c.imag=imag*c2.real+real*c2.imag;
 return c;}
```

```
Complex Complex::operator/(Complex &c2)
{Complex c;

c.real=(real*c2.real+imag*c2.imag)/(c2.real*c2.real+c2.i
mag*c2.imag);

c.imag=(imag*c2.real-real*c2.imag)/(c2.real*c2.real+c2.i
mag*c2.imag);
 return c;}

void Complex::display()
{cout<<"("<<real<<","<<imag<<"i)"<<endl;}

int main()
{Complex c1(3,4),c2(5,-10),c3;
 c3=c1+c2;
 cout<<"c1+c2=";
 c3.display();
 c3=c1-c2;
 cout<<"c1-c2=";
 c3.display();
```

```
 c3=c1*c2;
 cout<<"c1*c2=";
 c3.display();
 c3=c1/c2;
 cout<<"c1/c2=";
 c3.display();
 return 0;
}
```

10.3 题

```
#include  <iostream>            //用  VC++时改为：  #include
<iostream.h>
using namespace std;          //用 VC++时为取消此行
class Complex
 {public:
    Complex(){real=0;imag=0;}
    Complex(double r,double i){real=r;imag=i;}
    Complex operator+(Complex &c2);
    Complex operator+(int &i);
    friend Complex operator+(int&,Complex &);
    void display();
  private:
```

```
    double real;
    double imag;
 };

Complex Complex::operator+(Complex &c)
{return Complex(real+c.real,imag+c.imag);}

Complex Complex::operator+(int &i)
{return Complex(real+i,imag);}

void Complex::display()
{cout<<"("<<real<<","<<imag<<"i)"<<endl;}

Complex operator+(int &i,Complex &c)
{return Complex(i+c.real,c.imag);}

int main()
{Complex c1(3,4),c2(5,-10),c3;
 int i=5;
 c3=c1+c2;
 cout<<"c1+c2=";
 c3.display();
```

```
 c3=i+c1;
 cout<<"i+c1=";
 c3.display();
 c3=c1+i;
 cout<<"c1+i=";
 c3.display();
 return 0;
}
```

10.4 题

```
#include <iostream>
using namespace std;
class  Matrix                                          //
```

定义 Matrix 类

```
 {public:
    Matrix();                                          //
```

默认构造函数

```
    friend Matrix operator+(Matrix &,Matrix &);        //重
```

载运算符“+”

```
    void  input();                                     //
```

输入数据函数

```
    void  display();                                   //
```

输出数据函数

```
  private:
    int mat[2][3];
};

Matrix::Matrix()                                    //
```

定义构造函数

```
{for(int i=0;i<2;i++)
  for(int j=0;j<3;j++)
    mat[i][j]=0;
}

Matrix operator+(Matrix &a,Matrix &b)               //
```

定义重载运算符“+”

函数

```
{Matrix c;
 for(int i=0;i<2;i++)
   for(int j=0;j<3;j++)
     {c.mat[i][j]=a.mat[i][j]+b.mat[i][j];}
 return c;
}
void Matrix::input()                                //
```

定义输入数据函数

```
{cout<<"input value of matrix:"<<endl;
 for(int i=0;i<2;i++)
   for(int j=0;j<3;j++)
     cin>>mat[i][j];
}

void Matrix::display()                                    //定
```

义输出数据函数

```
{for (int i=0;i<2;i++)
   {for(int j=0;j<3;j++)
     {cout<<mat[i][j]<<" ";}
      cout<<endl;}
}

int main()
{Matrix a,b,c;
 a.input();
 b.input();
 cout<<endl<<"Matrix a:"<<endl;
 a.display();
 cout<<endl<<"Matrix b:"<<endl;
```

```
 b.display();
 c=a+b;                                                    //用重
```
载运算符“+”实现两个

矩阵相加

```
 cout<<endl<<"Matrix c = Matrix a + Matrix b :"<<endl;
 c.display();
 return 0;
}
```

10.5 题

```
#include <iostream.h>
//using namespace std;
class Matrix
 {public:
    Matrix();
    friend Matrix operator+(Matrix &,Matrix &);
    friend ostream& operator<<(ostream&,Matrix&);
    friend istream& operator>>(istream&,Matrix&);
  private:
    int mat[2][3];
 };
```

```
Matrix::Matrix()
{for(int i=0;i<2;i++)
   for(int j=0;j<3;j++)
     mat[i][j]=0;
}

Matrix operator+(Matrix &a,Matrix &b)
{Matrix c;
 for(int i=0;i<2;i++)
    for(int j=0;j<3;j++)
       {c.mat[i][j]=a.mat[i][j]+b.mat[i][j];
       }
 return c;
}

istream& operator>>(istream &in,Matrix &m)
{cout<<"input value of matrix:"<<endl;
 for(int i=0;i<2;i++)
   for(int j=0;j<3;j++)
     in>>m.mat[i][j];
 return in;
}
```

```
ostream& operator<<(ostream &out,Matrix &m)
{for (int i=0;i<2;i++)
   {for(int j=0;j<3;j++)
     {out<<m.mat[i][j]<<" ";}
       out<<endl;}
  return out;
}

int main()
{ Matrix a,b,c;
  cin>>a;
  cin>>b;
  cout<<endl<<"Matrix a:"<<endl<<a<<endl;
  cout<<endl<<"Matrix b:"<<endl<<b<<endl;
  c=a+b;
  cout<<endl<<"Matrix c = Matrix a + Matrix
b :"<<endl<<c<<endl;
  return 0;
}
```

10.6 题

```
#include <iostream>
using namespace std;
class Complex
 {public:
    Complex(){real=0;imag=0;}
    Complex(double r){real=r;imag=0;}
    Complex(double r,double i){real=r;imag=i;}
    operator double(){return real;}
    void display();
   private:
    double real;
    double imag;
 };

void Complex::display()
{cout<<"("<<real<<", "<<imag<<")"<<endl;}

int main()
{Complex c1(3,4),c2;
 double d1;
 d1=2.5+c1;
 cout<<"d1="<<d1<<endl;
```

```
  c2=Complex(d1);
  cout<<"c2=";
  c2.display();
  return 0;
}
```

10.7 题

```
#include <iostream>
using namespace std;
class Student
{public:
   Student(int,char[],char,float);
   int get_num(){return num;}
   char * get_name(){return name;}
   char get_sex(){return sex;}
   void display()

{cout<<"num:"<<num<<"\nname:"<<name<<"\nsex:"<<se
x<<"\nscore:"<<score<<"\n
\n";}
  private:
   int num;
```

```
    char name[20];
    char sex;
    float score;
};

Student::Student(int n,char nam[],char s,float so)
  {num=n;
    strcpy(name,nam);
    sex=s;
    score=so;
}

class Teacher
  {public:
    Teacher(){}
    Teacher(Student&);
      Teacher(int n,char nam[],char sex,float pay);
      void display();
    private:
      int num;
      char name[20];
      char sex;
```

```
    float pay;
 };

Teacher::Teacher(int n,char nam[],char s,float p)
{num=n;
 strcpy(name,nam);
 sex=s;
 pay=p;
}

Teacher::Teacher(Student& stud)
 {num=stud.get_num();
  strcpy(name,stud.get_name());
  sex=stud.get_sex();
  pay=1500;}

void Teacher::display()
{cout<<"num:"<<num<<"\nname:"<<name<<"\nsex:"<<se
x<<"\npay:"<<pay<<"\n\n";}



int main()
```

```
{Teacher teacher1(10001,"Li",'f',1234.5),teacher2;
 Student student1(20010,"Wang",'m',89.5);
 cout<<"student1:"<<endl;
 student1.display();
 teacher2=Teacher(student1);
 cout<<"teacher2:"<<endl;
 teacher2.display();
 return 0;
}
```

11.1 题

```
#include <iostream>
using namespace std;
class Student
{public:
   void get_value()
    {cin>>num>>name>>sex;}
   void display( )
      {cout<<"num: "<<num<<endl;
        cout<<"name: "<<name<<endl;
        cout<<"sex: "<<sex<<endl;}
 private :
```

```
    int num;
    char name[10];
    char sex;
};

class Student1: public Student
 {public:
    void get_value_1()
     {get_value();
       cin>>age>>addr;}
    void display_1()
    {     cout<<"age:  "<<age<<endl;                //引用派生类
```
的私有成员，正确。
```
          cout<<"address:  "<<addr<<endl;}      //引用派生类
```
的私有成员，正确。
```
   private:
          int age;
          char addr[30];
 };

int   main()
 {Student1 stud1;
```

```
    stud1.get_value_1();
    stud1.display();
    stud1.display_1();
    return 0;
}
```

11.2 题

```
#include <iostream>
using namespace std;
class Student
{public:
    void get_value()
     {cin>>num>>name>>sex;}
    void display( )
       {cout<<"num: "<<num<<endl;
         cout<<"name: "<<name<<endl;
         cout<<"sex: "<<sex<<endl;}
  private :
     int num;
     char name[10];
     char sex;
};
```

```
class Student1: private Student
 {public:
    void get_value_1()
     {get_value();
       cin>>age>>addr;}
    void display_1()
          {display();
          cout<<"age:  "<<age<<endl;            //引用派生类的私有成员，正确。
          cout<<"address:  "<<addr<<endl;}      //引用派生类的私有成员，正确。
   private:
          int age;
          char addr[30];
 };

int main()
 {Student1 stud1;
  stud1.get_value_1();
  stud1.display_1();
  return 0;
```

```
}
```

11.3 题

```
#include <iostream>
using namespace std;
class Student                                   //声明基类
{public:                                        //基类公用成员
   void get_value();
   void display( );
 protected :                                    //基类保护成员
       int num;
       char name[10];
       char sex;
};

void Student::get_value()
 {cin>>num>>name>>sex;}

void Student::display( )
 {cout<<"num: "<<num<<endl;
   cout<<"name: "<<name<<endl;
   cout<<"sex: "<<sex<<endl;
```

```
 }

class Student1: protected Student                    //声明一个保护派生类
{public:
    void get_value_1();
    void display1( );
 private:
    int age;
    char addr[30];
};

void Student1::get_value_1()
 {get_value();
   cin>>age>>addr;
 }
void Student1::display1( )
   {cout<<"num: "<<num<<endl;              //引用基类的保护成员
    cout<<"name: "<<name<<endl;            //引用基类的保护成员
    cout<<"sex: "<<sex<<endl;              //引用基类的保护成
```

员

```
    cout<<"age:  "<<age<<endl;              //引用派生类的私
```

有成员

```
    cout<<"address:  "<<addr<<endl;       //引用派生类的私
```

有成员

```
  }

int main( )
 {Student1  stud1;                          //stud1  是派生类
```

student1 类的对象

```
  stud1.get_value_1();                      //调用派生类对象
```

stud1 的公用成员函数

```
  stud1.display1(  );                       //调用派生类对象
```

stud1 的公用成员函数

```
  return 0;
 }
```

11.4 题

```
#include <iostream>
using namespace std;
class Student                               //声明基类
{public:                                   //基类公用成员
```

```
    void get_value();
    void display( );
  protected :                                    //基类保护成员
        int num;
        char name[10];
        char sex;
};

void Student::get_value()
  {cin>>num>>name>>sex;}

void Student::display( )
  {cout<<"num: "<<num<<endl;
    cout<<"name: "<<name<<endl;
    cout<<"sex: "<<sex<<endl;
  }

class Student1: public Student                    //声明一个公
用派生类
{public:
     void get_value_1();
     void display1( );
```

```
 private:
    int age;
    char addr[30];
};

void Student1::get_value_1()
 {get_value();
   cin>>age>>addr;
 }
void Student1::display1( )
   {cout<<"num:  "<<num<<endl;              //引用基类的保护成员，合法
    cout<<"name:  "<<name<<endl;            //引用基类的保护成员，合法
    cout<<"sex:  "<<sex<<endl;              //引用基类的保护成员，合法
    cout<<"age:  "<<age<<endl;              //引用派生类的私有成员，合法
    cout<<"address:  "<<addr<<endl;         //引用派生类的私有成员，合法
   }
```

```
int main( )
 {Student1  stud1;                          //stud1  是派生类
student1 类的对象
   stud1.get_value_1();                     //调用派生类对象
stud1 的公用成员函数
get_value_1
   stud1.display1(  );                      //调用派生类对象
stud1 的公用成员函数
display1
   return 0;
 }
11.4 另一题#include <iostream>
using namespace std;
class Student                               //声明基类
{public:                                   //基类公用成员
   void get_value();
   void display( );
 protected :                               //基类保护成员
      int num;
      char name[10];
      char sex;
};
```

```
void Student::get_value()
 {cin>>num>>name>>sex;}

void Student::display( )
 {cout<<"num: "<<num<<endl;
   cout<<"name:"<<name<<endl;
   cout<<"sex:"<<sex<<endl;
 }

class Student1: protected Student                    //声明一
个公用派生类
{public:
    void get_value_1();
    void display1( );
 private:
    int age;
    char addr[30];
};

void Student1::get_value_1()
 {cin>>age>>addr;}
```

```
void Student1::display1( )
   {cout<<"age:"<<age<<endl;
     cout<<"address:"<<addr<<endl;
   }

int main( )
 {Student1  stud1;                          //stud1  是派生类
student1 类的对象
   stud1.get_value();
   stud1.get_value_1();
   stud1.display( );
   stud1.display1();                        //合法。display1 是派
生类中的公用成员函
数
   return 0;
 }
```

11.5 题

```
class A                          //A 为基类
```

```
{public:
   void f1( );
   int i;
 protected:
   void f2();
   int j;
 private:
   int k;
};

class B: public A                    //B 为 A 的公用派生类
{public:
   void f3( );
 protected:
   int m;
 private:
   int n;
};

class C: public B                    //C 为 B 的公用派生类
{public:
   void f4();
```

```
 private:
   int p;
};

int main()
{A a1;                                  //a1 是基类 A 的对象
 B b1;                                  //b1 是派生类 B 的对象
 C c1;                                  //c1 是派生类 C 的对象
 return 0;
}
```

11.6 题

```
#include <iostream>
using namespace std;
class A
{public:
   void f1( );
 protected:
   void f2();
 private:
   int i;
};
```

```
class B: public A
{public:
   void f3( );
   int k;
  private:
   int m;
};

class C: protected B
{public:
   void f4();
  protected:
   int n;
  private:
   int p;
};

class D: private C
{public:
   void f5();
  protected:
```

```
    int q;
  private:
    int r;
};

int main()
{A a1;
  B b1;
  C c1;
  D d1;
  return 0;
}
```

11.7 题

```
#include <iostream>
using namespace std;
class A
 {
   public:
     A(){a=0;b=0;}
     A(int i){a=i;b=0;}
     A(int i,int j){a=i;b=j;}
```

```
    void display(){cout<<"a="<<a<<" b="<<b;}
  private:
    int a;
    int b;
 };

class B    : public A
 {
  public:
    B(){c=0;}
    B(int i):A(i){c=0;}
    B(int i,int j):A(i,j){c=0;}
    B(int i,int j,int k):A(i,j){c=k;}
    void display1()
     {display();
       cout<<" c="<<c<<endl;
     }
    private:
     int c;
};

int main()
```

```
{     B b1;
       B b2(1);
       B b3(1,3);
       B b4(1,3,5);
       b1.display1();
       b2.display1();
       b3.display1();
       b4.display1();
     return 0;
}
```

11.8 题

```
#include <iostream>
using namespace std;
class A
 {
   public:
     A(){cout<<"constructing A "<<endl;}
     ~A(){cout<<"destructing A "<<endl;}
 };

class B    : public A
```

```
 {
   public:
    B(){cout<<"constructing B "<<endl;}
    ~B(){cout<<"destructing B "<<endl;}
};

class C    : public B
 {
   public:
    C(){cout<<"constructing C "<<endl;}
    ~C(){cout<<"destructing C "<<endl;}
};
int main()
{ C c1;
   return 0;
}
```

11.9 题

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

```
 {public:
    Teacher(string nam,int a,char s,string tit,string
ad,string t);
    void display();
   protected:
      string name;
      int age;
      char sex;
      string title;
      string addr;
      string tel;
};

Teacher::Teacher(string nam,int a,char s,string tit,string
ad,string t):
       name(nam),age(a),sex(s),title(tit),addr(ad),tel(t){ }
void Teacher::display()
       {cout<<"name:"<<name<<endl;
         cout<<"age"<<age<<endl;
         cout<<"sex:"<<sex<<endl;
         cout<<"title:"<<title<<endl;
         cout<<"address:"<<addr<<endl;
```

```
        cout<<"tel:"<<tel<<endl;
        }

class Cadre
 {public:
    Cadre(string nam,int a,char s,string p,string ad,string
t);
    void display();
   protected:
    string name;
    int age;
    char sex;
    string post;
    string addr;
    string tel;
 };

Cadre::Cadre(string nam,int a,char s,string p,string
ad,string t):
       name(nam),age(a),sex(s),post(p),addr(ad),tel(t){}

void Cadre::display()
```

```
    {cout<<"name:"<<name<<endl;
     cout<<"age:"<<age<<endl;
     cout<<"sex:"<<sex<<endl;
     cout<<"post:"<<post<<endl;
     cout<<"address:"<<addr<<endl;
     cout<<"tel:"<<tel<<endl;
    }

class Teacher_Cadre:public Teacher,public Cadre
 {public:
    Teacher_Cadre(string nam,int a,char s,string tit,string
p,string
ad,string t,float w);
    void show( );
  private:
     float wage;
 };

Teacher_Cadre::Teacher_Cadre(string  nam,int  a,char
s,string t,string
p,string ad,string tel,float w):
```

```
Teacher(nam,a,s,t,ad,tel),Cadre(nam,a,s,p,ad,tel),wage(
w) {}
void Teacher_Cadre::show( )
      {Teacher::display();
       cout<<"post:"<<Cadre::post<<endl;
       cout<<"wages:"<<wage<<endl;
       }

int main( )
 {Teacher_Cadre
te_ca("Wang-li",50,'f',"prof.","president","135 Beijing
Road,Shanghai","(021)61234567",1534.5);
   te_ca.show( );
   return 0;
}
```

11.10 题

```
#include <iostream>
#include <cstring>
using namespace std;
class Teacher                                          //教师类
 {public:
```

```
    Teacher(int,char  [],char);                    //声明构造函
数
    void  display();                               //声明输出函
数
  private:
   int num;
   char name[20];
   char sex;
  };

Teacher::Teacher(int  n,char  nam[],char  s)      //定义构造
函数
 {num=n;
  strcpy(name,nam);
  sex=s;
}

void Teacher::display()                            //定义输出函
数
 {cout<<"num:"<<num<<endl;
  cout<<"name:"<<name<<endl;
  cout<<"sex:"<<sex<<endl;
```

```
}

class BirthDate                                    //生日类
 {public:
     BirthDate(int,int,int);                       //声明构造函
数
     void  display();                               //声明输出
函数
     void  change(int,int,int);                    //声明修改函
数
   private:
     int year;
     int month;
     int day;
};

BirthDate::BirthDate(int  y,int  m,int  d)         //定义构造函
数
 {year=y;
   month=m;
   day=d;
 }
```

```
void  BirthDate::display()                    //定义输出
函数

{cout<<"birthday:"<<month<<"/"<<day<<"/"<<year<<endl
;}

void BirthDate::change(int y,int m,int d)      //定义修改函
数
 {year=y;
   month=m;
   day=d;
 }

class          Professor:public          Teacher
//教授类
 {public:
     Professor(int,char [],char,int,int,int,float);     //声明构
造函数
     void  display();                                    //
声明输出函数
     void  change(int,int,int);                          //声
```

明修改函数

```
    private:
     float area;
     BirthDate  birthday;                          //
```

定义 BirthDate 类的对

象作为数据成员

```
 };

Professor::Professor(int  n,char  nam[20],char  s,int  y,int
m,int d,float a):
 Teacher(n,nam,s),birthday(y,m,d),area(a){ }          //
```

定义构造函数

```
void  Professor::display()                            //
```

定义输出函数

```
{Teacher::display();
 birthday.display();
 cout<<"area:"<<area<<endl;
}

void Professor::change(int y,int m,int d)             //定
```

义修改函数

```
 {birthday.change(y,m,d);
 }

int main()
{Professor  prof1(3012,"Zhang",'f',1949,10,1,125.4);      //
定义 Professor 对象
prof1
 cout<<endl<<"original data:"<<endl;
 prof1.display();                                          //
调用 prof1 对象的
display 函数
 cout<<endl<<"new data:"<<endl;
 prof1.change(1950,6,1);
//调用 prof1 对象的
change 函数
 prof1.display();                                          //
调用 prof1 对象的
display 函数
 return 0;
}
```

```
//习题 12.1 中的 circle.cpp 文件
//CIRCLE.CPP
//#include <iostream.h>
Circle::Circle(float a,float b,float r):Point(a,b),radius(r){}

void Circle::setRadius(float r)
{radius=r;}

float Circle::getRadius() const {return radius;}

float Circle::area() const
{return 3.14159*radius*radius;}

ostream &operator<<(ostream &output,const Circle &c)
{output<<"Center=["<<c.x<<","<<c.y<<"],
r="<<c.radius<<", area="<<c.area()
<<endl;
  return output;
}
```

```
//习题 12.1 中的 circle.h 文件
//CIRCLE.H
#include "point.h"
class Circle:public Point
{public:
   Circle(float x=0,float y=0,float r=0);
   void setRadius(float);
   float getRadius() const;
   float area () const;
   friend ostream &operator<<(ostream &,const Circle &);
  protected:
   float radius;
};

//习题 12.1 中的 cylinder.cpp 文件
//CYLINDER.CPP
Cylinder::Cylinder(float a,float b,float r,float h)
      :Circle(a,b,r),height(h){}

void Cylinder::setHeight(float h){height=h;}

float Cylinder::getHeight() const {return height;}
```

```
float Cylinder::area() const
{ return 2*Circle::area()+2*3.14159*radius*height;}

float Cylinder::volume() const
{return Circle::area()*height;}

ostream &operator<<(ostream &output,const Cylinder&
cy)
{output<<"Center=["<<cy.x<<","<<cy.y<<"],
r="<<cy.radius<<", h="<<cy.height
        <<"\narea="<<cy.area()<<",
volume="<<cy.volume()<<endl;
 return output;
}

//习题 12.1 中的 cylinder.h 头文件
//CYLINDER.H
#include "circle.h"
class Cylinder:public Circle
{public:
   Cylinder (float x=0,float y=0,float r=0,float h=0);
```

```
    void setHeight(float);
    float getHeight() const;
    float area() const;
    float volume() const;
    friend ostream& operator<<(ostream&,const
Cylinder&);
  protected:
    float height;
};

//习题 12.1 中的 point.cpp 文件
//POINT.CPP
Point::Point(float a,float b)
{x=a;y=b;}
void Point::setPoint(float a,float b)
{x=a;y=b;}
ostream & operator<<(ostream &output,const Point &p)
{output<<"["<<p.x<<","<<p.y<<"]"<<endl;
  return output;
}

//习题 12.1 中的 point.h 头文件
```

```
//POINT.H
class Point
{public:
   Point(float=0,float=0);
   void setPoint(float,float);
   float getX() const {return x;}
   float getY() const {return y;}
   friend ostream & operator<<(ostream &,const Point &);
 protected:
   float x,y;
};
```

12.1 题

```
#include  <iostream>          //如用  VC++应改为：#include
<iosttram.h>
using namespace std;       //如用 VC++应取消此行
#include "cylinder.h"
#include "point.cpp"
#include "circle.cpp"
#include "cylinder.cpp"
int main()
```

```
{Cylinder cy1(3.5,6.4,5.2,10);
 cout<<"\noriginal              cylinder:\nx="<<cy1.getX()<<",
y="<<cy1.getY()<<", r="
        <<cy1.getRadius()<<",
h="<<cy1.getHeight()<<"\narea="<<cy1.area()
        <<", volume="<<cy1.volume()<<endl;
 cy1.setHeight(15);
 cy1.setRadius(7.5);
 cy1.setPoint(5,5);
 cout<<"\nnew cylinder:\n"<<cy1;
 Point &pRef=cy1;
 cout<<"\npRef as a point:"<<pRef;
 Circle &cRef=cy1;
 cout<<"\ncRef as a Circle:"<<cRef;
 return 0;
}
```

12.3 题

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

```
    Point(float a,float b):x(a),y(b){}
    ~Point(){cout<<"executing Point destructor"<<endl;}
  private:
    float x;
    float y;
};

class Circle:public Point
{public:
Circle(float a,float b,float r):Point(a,b),radius(r){}
    ~Circle(){cout<<"executing Circle destructor"<<endl;}
  private:
    float radus;
};

int main()
{Point *p=new Circle(2.5,1.8,4.5);
  delete p;
  return 0;
}
```

12.3 题另一解

```
#include <iostream>
using namespace std;
class Point
{public:
   Point(float a,float b):x(a),y(b){}
   ~Point(){cout<<"executing Point destructor"<<endl;}
  private:
   float x;
   float y;
};

class Circle:public Point
{public:
Circle(int a,int b,int r):Point(a,b),radius(r){}
   ~Circle(){cout<<"executing Circle destructor"<<endl;}
  private:
   float radus;
};

int main()
{Point *p=new Circle(2.5,1.8,4.5);
  Circle *pt=new Circle(2.5,1.8,4.5);
```

```
 delete pt;
 return 0;
}
```

12.3 题另一解

```
#include <iostream>
using namespace std;
class Point
{public:
   Point(float a,float b):x(a),y(b){}
   virtual ~Point(){cout<<"executing Point destructor"<<endl;}
 private:
   float x;
   float y;
};

class Circle:public Point
{public:
Circle(float a,float b,float r):Point(a,b),radius(r){}
   virtual ~Circle(){cout<<"executing Circle
```

```
destructor"<<endl;}
  private:
    float radus;
};

void main()
{Point *p=new Circle(2.5,1.8,4.5);
  delete p;
}
```

12.4 题

```
   #include <iostream>
using namespace std;
//定义抽象基类 Shape
class Shape
{public:
  virtual double area() const =0;                    //纯虚函数
};

//定义 Circle 类
class Circle:public Shape
```

```
{public:
Circle(double r):radius(r){}
//结构函数
  virtual double area() const {return 3.14159*radius*radius;};  //定义虚函数
 protected:
  double radius;
//半径
};

//定义 Rectangle 类
class Rectangle:public Shape
{public:
 Rectangle(double w,double h):width(w),height(h){}
//结构函数
 virtual double area() const {return width*height;}
//定义虚函数
 protected:
  double width,height;
//宽与高
```

```
};

class Triangle:public Shape
{public:
  Triangle(double w,double h):width(w),height(h){}
//结构函
数
  virtual double area() const {return 0.5*width*height;}
//定义虚
函数
 protected:
  double width,height;
//宽与高
};

//输出面积的函数
void printArea(const Shape &s)
{cout<<s.area()<<endl;}
//输出 s
的面积

int main()
```

```
{
  Circle                                                    circle(12.6);
//建立
Circle 类对象 circle
  cout<<"area of circle      =";
  printArea(circle);
//输出
circle 的面积
  Rectangle                                          rectangle(4.5,8.4);
//建立
Rectangle 类对象 rectangle
  cout<<"area of rectangle =";
  printArea(rectangle);
//输出
rectangle 的面积
  Triangle                                             triangle(4.5,8.4);
//建立
Triangle 类对象
  cout<<"area of triangle   =";
  printArea(triangle);                  //输出 triangle 的面积
  return 0;
}
```

12.5 题

```
#include <iostream>
using namespace std;
//定义抽象基类 Shape
class Shape
{public:
 virtual double area() const =0;
//纯虚函数
};

//定义 Circle(圆形)类
class Circle:public Shape
{public:
Circle(double r):radius(r){}
//结构函数
  virtual double area() const {return
3.14159*radius*radius;};   //定义虚函
数
 protected:
  double radius;
//半径
```

```
};

//定义 Square(正方形)类
class Square:public Shape
{public:
  Square(double s):side(s){}
//结构函数

  virtual double area() const {return side*side;}
//定义虚函
数
 protected:
  double side;
};

//定义 Rectangle(矩形)类
class Rectangle:public Shape
{public:
 Rectangle(double w,double h):width(w),height(h){}
//结构函数
 virtual double area() const {return width*height;}
//定义虚函
```

数

```
 protected:
   double                                   width,height;
//宽与高
};

//定义 Trapezoid(梯形)类
class Trapezoid:public Shape
{public:
   Trapezoid(double          t,double          b,double
h):top(t),bottom(t),height(h){} //结构
函数
   virtual      double      area()      const      {return
0.5*(top+bottom)*height;}          //定义
虚函数
 protected:
   double                                   top,bottom,height;
//上底
、下底与高
};

//定义 Triangle(三角形)类
```

```
class Triangle:public Shape
{public:
  Triangle(double w,double h):width(w),height(h){}
//结构函
数
  virtual double area() const {return 0.5*width*height;}
//定义虚
函数
 protected:
  double width,height;
//宽与高
};

int main()
{
 Circle circle(12.6);
//建立
Circle 类对象 circle
 Square square(3.5);
//建立
Square 类对象 square
 Rectangle rectangle(4.5,8.4);
```

```
//建立
Rectangle 类对象 rectangle
 Trapezoid                    trapezoid(2.0,4.5,3.2);
//建立
Trapezoid 类对象 trapezoid
 Triangle                     triangle(4.5,8.4);
//建立
Triangle 类对象
 Shape
*pt[5]={&circle,&square,&rectangle,&trapezoid,&triangle
};
                                        //定义基类
指针数组 pt，使它每
一个元素指向一个派生类对象
 double                       areas=0.0;
//areas 为
总面积
 for(int i=0;i<5;i++)
  {areas=areas+pt[i]->area();}
 cout<<"totol of all areas="<<areas<<endl;    //输出总面
积
 return 0;
```

```
}
```

13.1 题

```
#include <iostream>
#include <cmath>
using namespace std;
int main()
{double a,b,c,s,area;
 cout<<"please input a,b,c:";
 cin>>a>>b>>c;
 if (a+b<=c)
  cerr<<"a+b<=c,error!"<<endl;
 else if(b+c<=a)
  cerr<<"b+c<=a,error!"<<endl;
 else if (c+a<=b)
  cerr<<"c+a<=b,error!"<<endl;
 else
  {s=(a+b+c)/2;
   area=sqrt(s*(s-a)*(s-b)*(s-c));
   cout<<"area="<<area<<endl;}
 return 0;
}
```

13.1 题另一解

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

void input(double a,double b,double c)
{cout<<"please input a,b,c:";
 cin>>a>>b>>c;
}
void area(double a,double b,double c)
{double s,area;
 if (a+b<=c)
  cerr<<"a+b<=c,error!"<<endl;
 else if(b+c<=a)
  cerr<<"b+c<=a,error!"<<endl;
 else if (c+a<=b)
  cerr<<"c+a<=b,error!"<<endl;
 else
  {s=(a+b+c)/2;
   area=sqrt(s*(s-a)*(s-b)*(s-c));
   cout<<"area="<<area<<endl;}
```

```
}
int main()
{double a=2,b=3,c=5;
  input(a,b,c);
  area(a,b,c);
  return 0;
}
```

13.2 题

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

int main()
{float a[5];
  cout<<"input data:";
  for(int i=0;i<5;i++)
    cin>>a[i];
  cout<<setiosflags(ios::fixed)<<setprecision(2);
  for(i=0;i<5;i++)
    cout<<setw(10)<<a[i]<<endl;
  return 0;
```

```
}
```

13.2 题另一解

```
#include <iostream>
using namespace std;
int main()
{float a[5];
 int i;
 cout<<"input data:";
 for(i=0;i<5;i++)
   cin>>a[i];
 cout.setf(ios::fixed);
 cout.precision(2);
 for(i=0;i<5;i++)
   {cout.width(10);
    cout<<a[i]<<endl;}
 return 0;
}
```

13.3 题

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

```
using namespace std;
int main()
{
 for(int n=1;n<8;n++)
 cout<<setw(20-n)<<setfill(' ')<<" "              //nm
       <<setw(2*n-1)<<setfill('B')<<"B"<<endl;
 return 0;
}
```

13.4 题

```
#include <iostream>
#include <fstream>
using namespace std;                          //VC++ 6.0 要此行
//fun1 函数从键盘输入 20 个整数，分别存放在两个磁盘文件中

void fun1()
{int a[10];
 ofstream  outfile1("f1.dat"),outfile2("f2.dat");   //分别定义两个文件流对象
 if(!outfile1)                                  //检查打开 f1.dat 是否成功
   {cerr<<"open f1.dat error!"<<endl;
```

```
    exit(1);
   }
 if(!outfile2)                          //检查打开 f2.dat 是否
成功
   {cerr<<"open f2.dat error!"<<endl;
    exit(1);
   }
 cout<<"enter 10 integer numbers:"<<endl;
 for(int  i=0;i<10;i++)              //输入 10 个数存放到 f1.dat
文件中
   {cin>>a[i];
    outfile1<<a[i]<<" ";}
   cout<<"enter 10 integer numbers:"<<endl;
 for(i=0;i<10;i++)                  //输入10个数存放到f2.dat文件
中
   {cin>>a[i];
    outfile2<<a[i]<<" ";}
 outfile1.close();                    //关闭 f1.dat 文件
 outfile2.close();                    //关闭 f2.dat 文件
}

//从 f1,dat 读入 10 个数，然后存放到 f2.dat 文件原有数据的后
```

面

```
void fun2()
{ifstream infile("f1.dat");            //f1.dat 作为输入文件
 if(!infile)
  {cerr<<"open f1.dat error!"<<endl;
   exit(1);
  }
  ofstream outfile("f2.dat",ios::app);
 //f2.dat 作为输出文件，文件指针指向文件尾，向它写入的数据放在原来数据的后面
  if(!outfile)
   {cerr<<"open f2.dat error!"<<endl;
   exit(1);
  }
  int a;
  for(int i=0;i<10;i++)
   {infile>>a;                  //磁盘文件 f2.dat 读入一个整数
    outfile<<a<<" ";          //将该数存放到 f2.dat 中
   }
  infile.close();
  outfile.close();
 }
```

```
//从 f2.dat 中读入 20 个整数，将它们按从小到大的顺序存放到
f2.dat
void fun3()
{ifstream infile("f2.dat"); //定义输入文件流 infile，以输入方式
打开 f2.dat
 if(!infile)
  {cerr<<"open f2.dat error!"<<endl;
   exit(1);
  }
 int a[20];
 int i,j,t;
 for(i=0;i<20;i++)
  infile>>a[i];            //从磁盘文件 f2.dat 读入 20 个数放在数
组 a 中
 for(i=0;i<19;i++)        //用起泡法对 20 个数排序
   for(j=0;j<19-i;j++)
       if(a[j]>a[j+1])
          {t=a[j];a[j]=a[j+1];a[j+1]=t;}
  infile.close();                    //关闭输入文件 f2.dat
  ofstream outfile("f2.dat",ios::out);
// f2.dat 作为输出文件，文件中原有内容删除
```

```
   if(!outfile)
    {cerr<<"open f2.dat error!"<<endl;
     exit(1);}
cout<<"data in f2.dat:"<<endl;
   for( i=0;i<20;i++)
     {outfile<<a[i]<<"  ";          //向 f2.dat 输出已排序的 20 个
数
      cout<<a[i]<<" ";}             //同时输出到显示器
   cout<<endl;
   outfile.close();
}

int main()
{fun1();                            //分别调用 3 个函数
 fun2();
 fun3();
 return 0;
}
```

13.5 题

```
#include <iostream>
#include <fstream>
```

```
using namespace std;
struct staff
{int num;
 char name[20];
 int age;
 double    pay;
};
int main()
{staff
staf[7]={2101,"Li",34,1203,2104,"Wang",23,674.5,2108,"
Fun",54,778,

3006,"Xue",45,476.5,5101,"Ling",39,656.6},staf1;
 fstream iofile("staff.dat",ios::in|ios::out|ios::binary);
 if(!iofile)
   {cerr<<"open error!"<<endl;
     abort();
   }
 int i,m,num;
 cout<<"Five staff :"<<endl;
 for(i=0;i<5;i++)
    {cout<<staf[i].num<<"                    "<<staf[i].name<<"
```

```
"<<staf[i].age<<" "<<staf
[i].pay<<endl;
      iofile.write((char *)&staf[i],sizeof(staf[i]));}
 cout<<"please input data you want insert:"<<endl;
 for(i=0;i<2;i++)
    {cin>>staf1.num>>staf1.name>>staf1.age>>staf1.pay;
      iofile.seekp(0,ios::end);
      iofile.write((char *)&staf1,sizeof(staf1));}
  iofile.seekg(0,ios::beg);
  for(i=0;i<7;i++)
    {iofile.read((char *)&staf[i],sizeof(staf[i]));
      cout<<staf[i].num<<"                    "<<staf[i].name<<"
"<<staf[i].age<<" "<<staf
[i].pay<<endl;
    }
 bool find;
 cout<<"enter number you want search,enter 0 to stop.";
 cin>>num;
 while(num)
 {find=false;
  iofile.seekg(0,ios::beg);
  for(i=0;i<7;i++)
```

```
    {iofile.read((char *)&staf[i],sizeof(staf[i]));
      if(num==staf[i].num)
       {m=iofile.tellg();
        cout<<num<<" is No."<<m/sizeof(staf1)<<endl;
        cout<<staf[i].num<<"                "<<staf[i].name<<"
"<<staf[i].age<<" "<<staf
[i].pay<<endl;
        find=true;
        break;
       }
    }
   if(!find)
      cout<<"can't find "<<num<<endl;
   cout<<"enter number you want search,enter 0 to
stop.";
   cin>>num;
 }
   iofile.close();
   return 0;
}
```

13.6 题

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

struct student
{int num;
 char name[20];
 double score;
};
int main()
{student
stud[3]={1001,"Li",78,1002,"Wang",89.5,1004,"Fun",90},
stud1[3];
 char c[50];
 int i;
 ostrstream strout(c,50);
 for(i=0;i<3;i++)
   strout<<stud[i].num<<"                    "<<stud[i].name<<"
"<<stud[i].score<<" ";
 strout<<ends;
 cout<<"array c:"<<endl<<c<<endl<<endl;
```

```
 istrstream strin(c,50);
 for(i=0;i<3;i++)
   strin>>stud1[i].num>>stud1[i].name>>stud1[i].score;
 cout<<"data from array c to array stud1:"<<endl;
 for(i=0;i<3;i++)
   cout<<stud1[i].num<<"                "<<stud1[i].name<<"
"<<stud1[i].score<<endl;
 cout<<endl;
 return 0;
}
```

13.6 题另一题

```
#include <iostream>
#include <strstream>
using namespace std;
struct student
{int num;
 char name[20];
 double score;
};
int main()
{int i;
```

```
 student
stud[3]={1001,"Li",78,1002,"Wang",89.5,1004,"Fun",90},
stud1[3];
 char c[50];
 strstream strio(c,50,ios::in|ios::out);
 for(i=0;i<3;i++)
  strio<<stud[i].num<<"                    "<<stud[i].name<<"
"<<stud[i].score<<" ";
 strio<<ends;
 cout<<"array c:"<<endl<<c<<endl<<endl;
 for(i=0;i<3;i++)
  strio>>stud1[i].num>>stud1[i].name>>stud1[i].score;
 cout<<"data from array c to array stud1:"<<endl;
 for(i=0;i<3;i++)
  cout<<stud1[i].num<<"                  "<<stud1[i].name<<"
"<<stud1[i].score<<endl;
 cout<<endl;
 return 0;
}
```

14.1 题

```
#include <iostream>
```

```
#include <cmath>
using namespace std;
double q(double,double,double);
void main()
{double a,b,c,p,x1,x2;
 cout<<"please enter a,b,c:";
 cin>>a>>b>>c;
 p=-b/(2*a);
 try
  {x1=p+q(a,b,c);
   x2=p-q(a,b,c);
   cout<<"x1="<<x1<<endl<<"x2="<<x2<<endl;
  }
 catch(double d)

{cout<<"a="<<a<<",b="<<b<<",c="<<c<<",disc="<<d<<",
error!"<<endl;}
 cout<<"end"<<endl;
}

double q(double a,double b,double c)
 {double disc;
```

```
   disc=b*b-4*a*c;
   if (disc<0) throw disc;
   return sqrt(disc)/(2*a);
 }
```

14.2 题

```
#include <iostream>
#include <string>
using namespace std;
class Student
 {public:
    Student(int n,string nam)
     {cout<<"constructor-"<<n<<endl;
       num=n;name=nam;}
    ~Student(){cout<<"destructor-"<<num<<endl;}
    void get_data();
  private:
    int num;
    string name;
 };
void Student::get_data()
 {if(num==0) throw num;
```

```
    else cout<<num<<" "<<name<<endl;
    cout<<"in get_data()"<<endl;
  }

void fun()
{Student stud1(1101,"tan");
  stud1.get_data();
  try
    {Student stud2(0,"Li");
      stud2.get_data();
    }
  catch(int n)
    {cout<<"num="<<n<<",error!"<<endl;}
}
int main()
{cout<<"main begin"<<endl;
  cout<<"call fun()"<<endl;
  fun();
  cout<<"main end"<<endl;
  return 0;
}
```

14.3 题

```
//main file
#include <iostream>
using namespace std;
#include "xt14-3-h1.h"
#include "xt14-3-h2.h"
using namespace std;
using namespace student1;

int main()
 {Student stud1(1001,"Wang",18,"123 Beijing Road,Shanghua");
   stud1.show_data();
   student2::Student stud2(1102,"Li",'f',89.5);
   stud2.show_data();
   return 0;
 }
```

14.3 题 H1

```
//header1.h
```

```
#include <string>
namespace student1
 {class Student
     {public:
        Student(int n,string nam,int a,string addr)
         {num=n;name=nam;age=a;address=addr;}
        void show_data();
       private:
        int num;
        string name;
        int age;
        string address;
     };
   void Student::show_data()
     {cout<<"num:"<<num<<"              name:"<<name<<"
age:"<<age
            <<"   address:"<<address<<endl;
     }
 }
```

14.3 题 H2

//header2.h

```
#include <string>
namespace student2
 {class Student
    {public:
       Student(int n,string nam,char s,float sco)
          {num=n;name=nam;sex=s;score=sco;}
       void show_data();
      private:
       int num;
       string name;
       char sex;
       float score;
    };

   void Student::show_data()
    {cout<<"num:"<<num<<"                name:"<<name<<"
sex:"<<sex
            <<"
```