BÀI 1.1. STUDENT CLASS

```
#include "iostream"
#include "stdio.h"
#include "conio.h"
#include "iomanip"
```

```
class SINHVIEN
{
    char MASV[30];
    char HOTEN[50];
    int TUOI;
    float DIEM;
public:
    void NHAP();
    void XUAT();
};

void SINHVIEN::NHAP()
{
    cout<<"Ma SV:  ";    fflush(stdin);      gets(MASV);
    cout<<"Ho Ten: ";    fflush(stdin);      gets(HOTEN);
    cout<<"Tuoi:   ";    cin>>TUOI;
    cout<<"Diem:   ";    cin>>DIEM;
}
void SINHVIEN::XUAT()
{
    cout<<"Ma SV:  "<<MASV<<endl;
    cout<<"Ho ten: "<<HOTEN<<endl;
    cout<<"Tuoi:   "<<TUOI<<endl;
    cout<<"Diem:   "<<DIEM<<endl<<endl;
}
int main()
{
    SINHVIEN a, b;
    cout<<"Nhap thong tin cua sinh vien a:"<<endl;
    a.NHAP();
    cout<<"Nhap thong tin cua sinh vien b:"<<endl;
    b.NHAP();
    cout<<endl<<"Sinh vien a"<<endl;
    a.XUAT();
    cout<<"Sinh vien b"<<endl;
    b.XUAT();
    return 0;
}
```

BÀI 1.2. RECTANGLE CLASS

```
class HCN
{
    float D, R;
public:
    void NHAP();
    void VE();
```

```
    float DIENTICH();
    float CHUVI();
};
void HCN::NHAP()
{
    cout<<"Chieu dai : ";      cin>>D;
    cout<<"Chieu rong: ";      cin>>R;
}
void HCN::VE()
{
    for(int i=0; i<D; i++)
    {
        for(int j=0; j<R; j++)
            cout<<"*";
        cout<<endl;
    }
}
float HCN::DIENTICH()
{
    return D*R;
}
float HCN::CHUVI()
{
    return 2*(D+R);
}
int main()
{
   HCN x;
   x.NHAP();
   x.VE();
   cout<<"Dien tich HCN: "<<x.DIENTICH()<<endl;
   cout<<"Chu vi HCN   : "<<x.CHUVI();
   return 0;
}
```

BÀI 1.3. OBJECT ARRAY

```
class HANG
{
    char    MAHANG[10];
    char    TENHANG[20];
    float   DONGIA;
    int     SOLUONG;
public:
    void NHAP();
    void XUAT();
};

void HANG::NHAP()
{
```

```
    cout<<"Ma hang  : ";      fflush(stdin);    gets(MAHANG);
    cout<<"Ten hang : ";      fflush(stdin);    gets(TENHANG);
    cout<<"Don gia  : ";      cin>>DONGIA;
    cout<<"So luong : ";      cin>>SOLUONG;
}
void HANG::XUAT()
{
     cout<<setw(10)<<MAHANG<<setw(20)<<TENHANG<<setw(10)<<DONGIA<<set
     w(10)<<SOLUONG<<setw(20)<<DONGIA*SOLUONG<<endl;
}

int main()
{
   int n;
   cout<<"Nhap so mat hang: "; cin>>n;
   Hang * x = new HANG[n];
   for(int i=0; i<n; i++)
   {
       cout<<"Nhap hang "<<i+1<<endl;
       x[i].NHAP();
   }
   cout<<setw(10)<<"MA HANG"<<setw(20)<<"TEN HANG"<<setw(10)<<"DON
   GIA"<<setw(10)<<"SO LUONG"<<setw(20)<<"THANH TIEN"<<endl;
   for(int i=0; i<n; i++)
       x[i].XUAT();
   return 0;
}
```

BÀI 1.4. OBJECT ARRAY CONTINUE

```
class SACH
{
    char    MASACH[10];
    char    TENSACH[20];
    int     SOTRANG;
    float   GIATIEN;
public:
    void NHAP();
    void XUAT();
};
void SACH::NHAP()
{

    cout<<"Ma sach  : ";      fflush(stdin);      gets(MASACH);
    cout<<"Ten sach : ";      fflush(stdin);      gets(TENSACH);
    cout<<"So trang : ";      cin>>SOTRANG;
    cout<<"Gia tien : ";      cin>>GIATIEN;
}
void SACH::XUAT()
{
```

```
    cout<<setw(10)<<MASACH<<setw(20)<<TENSACH<<setw(10)<<SOTRANG<<setw
    (10)<<GIATIEN<<endl;
}

int main()
{
   int n;
   cout<<"Nhap so sach: "; cin>>n;
   SACH *x=new SACH[n];
   for(int i=0; i<n; i++)
   {
       cout<<"Nhap sach thu "<<i+1<<endl;
       x[i].NHAP();
   }
   cout<<setw(10)<<"MA SACH"<<setw(20)<<"TEN SACH"<<setw(10)<<"SO
   TRANG"<<setw(10)<<"GIA TIEN"<<endl;
   for(int i=0; i<n; i++)
       x[i].XUAT();
   return 0;
}
```

BÀI 1.5. ARRAY OF NUMBERS

```
class MANG
{
    int *a;
    int n;
public:
    void NHAP();
    void XUAT();
    void SAP();
};
void MANG::NHAP()
{
    cout<<"n= ";    cin>>n;    a=new int[n];
    for(int i=0; i<n; i++)
    {
        cout<<"a["<<i<<"]="; cin>>a[i];
    }
}
void MANG::XUAT()
{
   cout<<endl;
   for(int i=0; i<n; i++)
       cout<<a[i]<<" ";
}
void MANG::SAP()
{
    for(int i=0; i<n; i++)
    for(int j=i+1; j<n; j++)
```

```
    if(a[i]>a[j])
    {
        int tg=a[i]; a[i]=a[j]; a[j]=tg;
    }
}
int main()
{
   MANG x;
   x.NHAP();   x.SAP();   x.XUAT();
   return 0;
}
```

BÀI 1.6. COMPLETE

```
class MANG
{
    float *a;
    int n;
public:
    void NHAP();
    void XUAT();
    float MAX();
    float MIN();
};
void MANG::NHAP()
{
    cout<<"n= ";    cin>>n;    a=new float[n];
    for(int i=0; i<n; i++)
    {
        cout<<"a["<<i<<"]="; cin>>a[i];
    }
}
void MANG::XUAT()
{
   cout<<endl;
   for(int i=0; i<n; i++)
        cout<<a[i]<<" ";
}
float MANG::MAX()
{
    float M=a[0];
    for(int i=0; i<n; i++)
    if(a[i]>M)   M=a[i] ;
    return M;
}
float MANG::MIN()
{
    float M=a[0];
    for(int i=0; i<n; i++)
    if(a[i]<M) M=a[i];
```

```
    return M;
}
int main()
{
    MANG x;
    x.NHAP();
    cout<<"Mang vua nhap:"<<endl;
    x.XUAT();
    cout<<"MAX="<<x.MAX()<<" MIN="<<x.MIN();
    return 0;
}
```

BÀI 2.1. DATE TYPE

```
class DATE
{
    int D, M, Y;
public:
    void NHAP();
    void XUAT();
};
class NHANSU
{
    char MANS[20];
    char HOTEN[30];
    DATE NS;
public:
    void NHAP();
    void XUAT();
};
void DATE::NHAP()
{
    cout<<"Day:   ";    cin>>D;
    cout<<"Month: ";    cin>>M;
    cout<<"Year:  ";    cin>>Y;
}
void DATE::XUAT()
{
   cout<<setw(10)<<D<<"/"<<M<<"/"<<Y<<endl;
}
void NHANSU::NHAP()
{
    cout<<"Ma nhan su:  ";      fflush(stdin);      gets(MANS);
    cout<<"Ten nhan su: ";      fflush(stdin);      gets(HOTEN);
    cout<<"Ngay thang nam sinh:"<<endl;
    NS.NHAP();
}
void NHANSU::XUAT()
{
```

```
     cout<<setw(10)<<MANS<<setw(15)<<HOTEN;
     NS.XUAT();
}
int main()
{
    NHANSU x;
    x.NHAP();
    cout<<endl<<"Nhan su vua nhap:"<<endl;
    x.XUAT();
   return 0;
}
```

BÀI 2.2. ONE-ONE RELATIONSHIP

```
class NSX
{
    char MANSX[20];
    char TENNSX[20];
    char DCNSX[20];
public:
    void NHAP();
    void XUAT();
};
class HANG
{
    char MANHANG[20];
    char TENHANG[30];
    NSX x;
public:
    void NHAP();
    void XUAT();
};
void NSX::NHAP()
{
    cout<<"Ma NSX : ";      fflush(stdin);      gets(MANSX);
    cout<<"Ten NSX: ";      fflush(stdin);      gets(TENNSX);
    cout<<"DC NSX:  ";      fflush(stdin);      gets(DCNSX);
}
void NSX::XUAT()
{
    cout<<"Ma NSX : "<<MANSX<<endl;
    cout<<"Ten NSX: "<<TENNSX<<endl;
    cout<<"DC NSX:  "<<DCNSX<<endl;
}
void HANG::NHAP()
{
    cout<<"Ma hang:  ";      fflush(stdin);      gets(MANHANG);
    cout<<"Ten hang: ";      fflush(stdin);      gets(TENHANG);
    cout<<"Nha san xuat:"<<endl;
    x.NHAP();
```

```
}
void HANG::XUAT()
{
    cout<<"Ma hang:  "<<MANHANG<<endl;
    cout<<"Ten hang: "<<TENHANG<<endl;
    cout<<"Nha san xuat: ";
    x.XUAT();
}
int main()
{
    HANG x;
    x.NHAP();
    cout<<endl<<"Mat hang vua nhap:"<<endl;
    x.XUAT();
    return 0;
}
```

BÀI 2.3. ONE-INFINITY RELATIONSHIP

```
class HANG
{
    char MAHANG[20];
    char TENHANG[20];
    float DONGIA;
public:
    void NHAP();
    void XUAT();
};
class PHIEU
{
    char MAPHIEU[20];
    HANG *x;
    int n;
public:
    void NHAP();
    void XUAT();
};
void HANG::NHAP()
{
    cout<<"Ma Hang : ";      fflush(stdin);      gets(MAHANG);
    cout<<"Ten Hang: ";      fflush(stdin);      gets(TENHANG);
    cout<<"Don Gia:  ";      cin>>DONGIA;
}
void HANG::XUAT()
{
cout<<setw(10)<<MAHANG<<setw(20)<<TENHANG<<setw(10)<<DONGIA<<endl;
}
void PHIEU::NHAP()
{
    cout<<"Ma Phieu:  ";        fflush(stdin);      gets(MAPHIEU);
    cout<<"Nhap so mat hang: "; cin>>n;
```

```
    x=new HANG[n];
    for(int i=0; i<n; i++)
        x[i].NHAP();
}
void PHIEU::XUAT()
{
    cout<<"   Ma Phieu:  "<<MAPHIEU<<endl;
    cout<<setw(10)<<"MA HANG"<<setw(20)<<"TEN
     HANG"<<setw(10)<<"DONGIA"<<endl;
    for(int i=0; i<n; i++)
        x[i].XUAT();
}
int main()
{
    PHIEU a;
    a.NHAP();
    cout<<endl<<setw(30)<<"PHIEU NHAP HANG"<<endl;
    a.XUAT();
    return 0;
}
```

BÀI 2.4. MIXED RELATIONSHIP

```
class MAY
{
    char MAMAY[10];
    char KIEUMAY[20];
    char TINHTRANG[20];
public:
    void NHAP();
    void XUAT();
};
class QUANLY
{
    char MAQL[10];
    char TENQL[20];
public:
    void NHAP();
    void XUAT();
};
class PHONGMAY
{
    char MAPHONG[10];
    char TENPHONG[20];
    QUANLY x;
    MAY *y;
    int n;
public:
    void NHAP();
    void XUAT();
```

```
};
void MAY::NHAP()
{
    cout<<"Ma May :    ";     fflush(stdin);      gets(MAMAY);
    cout<<"Kieu May:   ";     fflush(stdin);      gets(KIEUMAY);
    cout<<"Tinh Trang: ";     fflush(stdin);      gets(TINHTRANG);
}
void MAY::XUAT()
{
cout<<setw(10)<<MAMAY<<setw(20)<<KIEUMAY<<setw(20)<<TINHTRANG<<endl;
}
void QUANLY::NHAP()
{
    cout<<"Ma nguoi quan ly:  ";   fflush(stdin);      gets(MAQL);
    cout<<"Ten nguoi quan ly: ";   fflush(stdin);      gets(TENQL);
}
void QUANLY::XUAT()
{
    cout<<"Ma nguoi quan ly:  "<<MAQL<<endl;
    cout<<"Ten nguoi quan ly: "<<TENQL<<endl;
}
void PHONGMAY::NHAP()
{
    cout<<"Ma phong: ";     fflush(stdin);      gets(MAPHONG);
    cout<<"Ten phong:";     fflush(stdin);      gets(TENPHONG);
    x.NHAP();
    cout<<"Nhap so may:";   cin>>n;
    y=new MAY[n];
    for(int i=0; i<n; i++)
        y[i].NHAP();
}
void PHONGMAY::XUAT()
{
    cout<<endl<<"Ma phong: "<<MAPHONG;
    cout<<". Ten phong: "<<TENPHONG<<endl;
    x.XUAT();
    cout<<setw(10)<<"MA MAY"<<setw(20)<<"KIEU MAY"<<setw(20)<<"TINH
    TRANG"<<endl;
    for(int i=0; i<n; i++)
        y[i].XUAT();
}
int main()
{
    PHONGMAY a;
    a.NHAP();
    a.XUAT();
    return 0;
}
```

BÀI 3.1. FRIEND FUNCTION

```
class SINHVIEN
{
    char MASINHVIEN[10];
    char HOTEN[20];
    float TOAN, LY, HOA;
public:
    void NHAP();
    void XUAT();
    friend void SAP(SINHVIEN *a, int n);
};
void SINHVIEN::NHAP()
{
    cout<<"Ma sinh vien: ";     fflush(stdin);      gets(MASINHVIEN);
    cout<<"Ho ten: ";           fflush(stdin);      gets(HOTEN);
    cout<<"Diem toan: ";        cin>>TOAN;
    cout<<"Diem ly: ";          cin>>LY;
    cout<<"Diem hoa: ";         cin>>HOA;
}
void SINHVIEN::XUAT()
{
cout<<setw(10)<<MASINHVIEN<<setw(20)<<HOTEN<<setw(10)<<TOAN<<setw(10)
<<LY<<setw(10)<<HOA<<setw(10)<<TOAN+LY+HOA<<endl;
}

void SAP(SINHVIEN *a, int n)
{
    for(int i=0; i<n; i++)
    for(int j=i+1; j<n; j++)
    if(a[i].TOAN+a[i].LY+a[i].HOA > a[j].TOAN+a[j].LY+a[j].HOA)
    {
        SINHVIEN tg=a[i]; a[i]=a[j]; a[j]=tg;
    }
}
int main()
{
    SINHVIEN *a; int n;
    cout<<"Nhap so sinh vien: "; cin>>n;
    a=new SINHVIEN[n];
    for(int i=0; i<n; i++)
    a[i].NHAP();
    SAP(a,n);
    for(int i=0; i<n; i++)
    a[i].XUAT();
    return 0;
}
```

BÀI 3.2. FRIEND CLASS

```
class NSX
```

```
{
    char MANSX[20];
    char TENNSX[20];
    char DCNSX[20];
    friend class HANG;      //lớp bạn
};
class HANG
{
    char MANHANG[20];
    char TENHANG[30];
    float DONGIA, TRONGLUONG;
    NSX x;
public:
    void NHAP();
    void XUAT();
};
void HANG::NHAP()
{
    cout<<"Ma hang:  ";      fflush(stdin);     gets(MANHANG);
    cout<<"Ten hang: ";      fflush(stdin);     gets(TENHANG);
    cout<<"Don gia:  ";      cin>>DONGIA;
    cout<<"Trong luong: ";   cin>>TRONGLUONG;
    cout<<"Ma NSX: ";        fflush(stdin);     gets(x.MANSX);
    cout<<"Ten NSX:";        fflush(stdin);     gets(x.TENNSX);
    cout<<"Dia chi:";        fflush(stdin);     gets(x.DCNSX);
}
void HANG::XUAT()
{
    cout<<"Ma hang:     "<<MANHANG<<endl;
    cout<<"Ten hang:    "<<TENHANG<<endl;
    cout<<"Don gia:     "<<DONGIA<<endl;
    cout<<"Trong luong: "<<TRONGLUONG<<endl;
    cout<<"Ma NSX:      "<<x.MANSX<<endl;
    cout<<"Ten NSX:     "<<x.TENNSX<<endl;
    cout<<"Dia chi:     "<<x.DCNSX<<endl;
}
int main()
{
    HANG x;
    x.NHAP();
    cout<<endl<<"Mat hang vua nhap:"<<endl;
    x.XUAT();
    return 0;
}
```

BÀI 3.3. FRIENDS

```
class HANG;
class DATE
{
    int D, M, Y;
```

```
    friend void IN(HANG a[], int n, int NAM);
    friend class HANG;
};
class HANG
{
    char MANHANG[20];
    char TENHANG[30];
    DATE x;
public:
    void NHAP();
    void XUAT();
    friend void IN(HANG a[], int n);
};
void HANG::NHAP()
{
    cout<<"Ma hang:  ";      fflush(stdin);      gets(MANHANG);
    cout<<"Ten hang: ";      fflush(stdin);      gets(TENHANG);
    cout<<"Nhap Ngay san xuat: "<<endl;
    cout<<"Ngay: ";          cin>>x.D;
    cout<<"Thang: ";         cin>>x.M;
    cout<<"Nam: ";           cin>>x.Y;
}
void HANG::XUAT()
{
    cout<<"Ma hang:     "<<MANHANG<<endl;
    cout<<"Ten hang:    "<<TENHANG<<endl;
    cout<<"Nhap Ngay san xuat: "<<x.D<<"/"<<x.M<<"/"<<x.Y<<endl;
}
void IN(HANG a[], int n)
{
    for(int i=0; i<n; i++)
        if(a[i].x.Y==2017) a[i].XUAT();
}
int main()
{
    HANG *a; int n;
    cout<<"Nhap so mat hang: "; cin>>n;
    a=new HANG[n];
    for(int i=0; i<n; i++)
    a[i].NHAP();
    cout<<endl<<"Mat hang nhap: 2017"<<endl;
    IN(a, n);
    return 0;
}
```

BÀI 3.4. CONSTRUCTOR METHODS

```
class PTB2
{
    float a, b, c;
```

```
public:
    void NHAP();
    void XUAT();
    void GIAI();
    PTB2();
    PTB2(float x, float y, float z);
};
void PTB2::NHAP()
{
    cout<<"Nhap cac he so: "<<endl;
    cout<<"a=";     cin>>a;
    cout<<"b=";     cin>>b;
    cout<<"c=";     cin>>c;
}
void PTB2::XUAT()
{
   cout<<"Phuong trinh: "<<a<<"X"<<(char)253<<" + "<<b<<"X + "<<c<<"
= 0"<<endl;
}
void PTB2::GIAI()
{
    if(a==0)
        cout<<"Day khong phai ptb2"<<endl;
    else
    {
        float delta = b*b-4*a*c;
        if(delta<0)
            cout<<"Phuong trinh vo nghiem"<<endl;
        else
        {
            cout<<"X1="<<(-b+sqrt(delta))/(2*a)<<endl;
            cout<<"X2="<<(-b-sqrt(delta))/(2*a)<<endl;
        }
    }
}
PTB2::PTB2()
{
    a=b=c=0;
}
PTB2::PTB2(float x, float y, float z)
{
    a=x; b=y; c=z;
}
int main()
{
   PTB2 P(1, 2, 1);  P.XUAT();  P.GIAI();
   PTB2 Q;           Q.NHAP();  Q.XUAT();   Q.GIAI();
   return 0;
}
```

BÀI 3.5. CONSTRUCTOR/ DESTRUCTOR METHODS

```
class ARRAY
{
    int *VALUE;
    int n;
public:
    ARRAY();
    ARRAY(int x);
    ~ARRAY();
    void NHAP();
    void XUAT();
};
ARRAY::ARRAY()
{
    n=0; VALUE=NULL;
}

ARRAY::ARRAY(int x)
{
    n=x;
    VALUE = new int[n];
    for(int i=0; i<n; i++)
        VALUE[i]=0;
}



ARRAY::~ARRAY()
{
    n=0; VALUE=NULL;  //OR: delete [] VALUE;
}
void ARRAY::NHAP()
{
   if(n==0)          {cout<<"n="; cin>>n;}
   if(VALUE==NULL)  VALUE = new int[n];
   for(int i=0; i<n; i++)
   {
       cout<<"VALUE["<<i<<"]=";
       cin>>VALUE[i];
   }
}
void ARRAY::XUAT()
{
   for(int i=0; i<n; i++)
   cout<<VALUE[i]<<" ";
}
int main()
{
    ARRAY x(8);
```

```
    cout<<endl<<"Mang vua khoi tao : ";
    x.XUAT();
    cout<<endl<<"Nhap mang: "<<endl;
    x.NHAP();
    cout<<endl<<"Mang vua nhap: ";
    x.XUAT();
    return 0;
}
```

BÀI O1.1. COUPON

```
class NSX
{
    char MANSX[10];
    char TENNSX[20];
    char DCNSX[20];
public:
    void NHAP();
    void XUAT();
};
class HANG
{
    char TENHANG[20];
    float DONGIA;
    int SOLUONG;
public:
    void NHAP();
    void XUAT();
    friend class PHIEUNHAPHANG;
};
class PHIEUNHAPHANG
{
    char MAPHIEU[20];
    char NGAYLAP[20];
    NSX y;
    HANG *x;
    int n;
public:
    void NHAP();
    void XUAT();
};
void NSX::NHAP()
{
    cout<<"Ma NSX:  ";      fflush(stdin);      gets(MANSX);
    cout<<"Ten NSX: ";      fflush(stdin);     gets(TENNSX);
    cout<<"DC NSX:  ";      fflush(stdin);      gets(DCNSX);
}
void NSX::XUAT()
{
    cout<<"Ma NSX:  "<<setw(15)<<MANSX;
```

```
    cout<<setw(15)<<"Ten NSX: "<<setw(15)<<TENNSX<<endl;
    cout<<"DC NSX:  "<<DCNSX<<endl;
}
void HANG::NHAP()
{
    cout<<"Ten hang: ";     fflush(stdin);      gets(TENHANG);
    cout<<"Don gia:  ";     cin>>DONGIA;
    cout<<"So luong: ";     cin>>SOLUONG;
}
void HANG::XUAT()
{
     cout<<setw(20)<<TENHANG<<setw(10)<<DONGIA<<setw(10)<<SOLUONG
     <<setw(10)<<DONGIA*SOLUONG<<endl;
}
void PHIEUNHAPHANG::NHAP()
{
    cout<<"Ma phieu: ";     fflush(stdin);      gets(MAPHIEU);
    cout<<"Ngay lap: ";     fflush(stdin);      gets(NGAYLAP);
    y.NHAP();
    cout<<"Nhap so mat hang: ";                 cin>>n;
    x=new HANG[n];
    for(int i=0; i<n; i++)
        x[i].NHAP();
}
void PHIEUNHAPHANG::XUAT()
{
    cout<<setw(40)<<"PHIEU NHAP HANG"<<endl;
    cout<<"Ma phieu: "<<setw(15)<<MAPHIEU;
    cout<<setw(15)<<"Ngay lap: "<<setw(15)<<NGAYLAP<<endl;
    y.XUAT();
    cout<<setw(20)<<"TEN HANG"<<setw(10)<<"DON GIA"<<setw(10)
    <<"SO LUONG"<<setw(10)<<"THANH TIEN"<<endl;
    for(int i=0; i<n; i++)
        x[i].XUAT();
    double TONGTIEN=0;
    for(int i=0; i<n; i++)
          TONGTIEN += x[i].DONGIA*x[i].SOLUONG;
    cout<<setw(50)<<"Cong thanh tien: "<<TONGTIEN<<endl;
}
int main()
{
    PHIEUNHAPHANG a;
    a.NHAP();
    a.XUAT();
    return 0;
}
```

BÀI O1.2. TRANSCRIPT

```
class SINHVIEN
```

```
{
    char MASV[20];
    char TENSV[20];
    char LOP[10];
    char KHOA[10];
public:
    void NHAP();
    void XUAT();
};
class MON
{
    char TENMON[20];
    int SOTRINH;
    float DIEM;
public:
    void NHAP();
    void XUAT();
    friend class PHIEUBAODIEM;
};
class PHIEUBAODIEM
{
    SINHVIEN x;
    MON *y;
    int n;
public:
    void NHAP();
    void XUAT();
};
void SINHVIEN::NHAP()
{
    cout<<"Ma sv: ";        fflush(stdin);      gets(MASV);
    cout<<"Ten sv: ";       fflush(stdin);      gets(TENSV);
    cout<<"Lop: ";          fflush(stdin);      gets(LOP);
    cout<<"Khoa: ";         fflush(stdin);      gets(KHOA);
}
void SINHVIEN::XUAT()
{
    cout<<"Ma sv:  "<<MASV<<"\t";
    cout<<"Ten sv: "<<TENSV<<endl;
    cout<<"Lop:    "<<LOP<<"\t";
    cout<<"Khoa:   "<<KHOA<<endl;
}
void MON::NHAP()
{
    cout<<"Ten mon: ";      fflush(stdin);      gets(TENMON);
    cout<<"So trinh:";      cin>>SOTRINH;
    cout<<"Diem:    ";      cin>>DIEM;
}
void MON::XUAT()
{
```

```
    cout<<setw(20)<<TENMON<<setw(20)<<SOTRINH<<setw(20)<<DIEM<<endl;
}
void PHIEUBAODIEM::NHAP()
{
    x.NHAP();
    cout<<"Nhap so mon: ";      cin>>n;
    y=new MON[n];
    for(int i=0; i<n; i++)
        y[i].NHAP();
}
void PHIEUBAODIEM::XUAT()
{
    cout<<setw(40)<<"PHIEU BAO DIEM"<<endl<<endl;
    x.XUAT();
    cout<<"Bang diem:"<<endl;
    cout<<setw(20)<<"TEN MON"<<setw(20)<<"SO RINH"<<setw(20)
    <<"DIEM"<<endl;
    for(int i=0; i<n; i++)
        y[i].XUAT();
    float TONGDIEM=0; int TONGSOTRINH=0;
    for(int i=0; i<n; i++)
    {
        TONGDIEM    += y[i].DIEM*y[i].SOTRINH;
        TONGSOTRINH += y[i].SOTRINH;
    }
    if(TONGSOTRINH !=0)
      cout<<setw(40)<<"Diem trung binh:"<<TONGDIEM/TONGSOTRINH<<endl;
}
int main()
{
    PHIEUBAODIEM a;
    a.NHAP();
    a.XUAT();
    return 0;
}
```

BÀI O1.3. INVENTORY

```
class NHANVIEN
{
    char HOTENNV[20];
    char CHUCVUNV[20];
public:
    void NHAP();
    void XUAT();
};
class PHONG
{
    char MAPH[20];
    char TENPH[20];
```

```
    char TRUONGPH[20];
public:
    void NHAP();
    void XUAT();
};
class TAISAN
{
    char TENTS[20];
    int SOLUONGTS;
    char TINHTRANGTS[20];
public:
    void NHAP();
    void XUAT();
    friend class PHIEUKIEMKE;
};
class PHIEUKIEMKE
{
    char MAPH[20];
    char NGAYKK[20];
    NHANVIEN x;
    PHONG y;
    TAISAN *z;
    int n;
public:
    void NHAP();
    void XUAT();
};
void NHANVIEN::NHAP()
{
    cout<<"Ho ten: ";       fflush(stdin);      gets(HOTENNV);
    cout<<"Chuc vu: ";      fflush(stdin);      gets(CHUCVUNV);
}
void NHANVIEN::XUAT()
{
    cout<<"Nhan vien kiem ke: "<<HOTENNV<<"\t"<<"Chuc vu: "
    <<CHUCVUNV<<endl;
}
void PHONG::NHAP()
{
    cout<<"Ma phong: ";     fflush(stdin);      gets(MAPH);
    cout<<"Ten phong:";     fflush(stdin);      gets(TENPH);
    cout<<"Truong phong: "; fflush(stdin);      gets(TRUONGPH);
}
void PHONG::XUAT()
{
    cout<<"Kiem ke tai phong: "<<TENPH<<"\t"<<"Ma phong: "
    <<MAPH<<endl;
    cout<<"Truong phong: "<<TRUONGPH<<endl;
}
void TAISAN::NHAP()
```

```
{
    cout<<"Ten tai san: ";      fflush(stdin);    gets(TENTS);
    cout<<"So luong: ";         cin>>SOLUONGTS;
    cout<<"Tinh trang: ";       fflush(stdin);    gets(TINHTRANGTS);
}
void TAISAN::XUAT()
{
    cout<<setw(20)<<TENTS<<setw(20)<<SOLUONGTS<<setw(20)<<TINHTRANGTS
    <<endl;
}
void PHIEUKIEMKE::NHAP()
{
    cout<<"Ma phieu: ";     fflush(stdin);      gets(MAPH);
    cout<<"Ngay kiem ke: "; fflush(stdin);      gets(NGAYKK);
    x.NHAP();
    y.NHAP();
    cout<<"Nhap so tai san kiem ke: ";  cin>>n;
    z=new TAISAN[n];
    for(int i=0; i<n; i++)
        z[i].NHAP();
}
void PHIEUKIEMKE::XUAT()
{
    cout<<setw(40)<<"PHIEU KIEM KE TAI SAN"<<endl;
    cout<<"Ma phieu: "<<MAPH<<"\t"<<"Ngay kiem ke: "<<NGAYKK<<endl;
    x.XUAT();
    y.XUAT();
    cout<<setw(20)<<"TEN TS"<<setw(20)<<"SO LUONG"<<setw(20)
    <<"TINH TRANG"<<endl;
    for(int i=0; i<n; i++)
        z[i].XUAT();
    int TONGSL=0;
    for(int i=0; i<n; i++)
        TONGSL += z[i].SOLUONGTS;
    cout<<"So tai san kiem ke: "<<n<<"\t"<<". Tong so luong: "
    <<TONGSL<<endl;
}
int main()
{
    PHIEUKIEMKE a;
    a.NHAP();
    a.XUAT();
    return 0;
}
```

BÀI 4.1. PERSON

```
class PERSON
{
protected:
```

```
    char HOTEN[20];
    char NS[12];
    char QUEQUAN[30];
};
class KYSU : public PERSON
{
    char NGANH[20];
    int NAMTN;
public:
    void NHAP();
    void XUAT();
    friend void IN(KYSU *a, int n);
};
void KYSU::NHAP()
{   cout<<"Ho ten: ";       fflush(stdin);      gets(HOTEN);
    cout<<"Ngay sinh: ";    fflush(stdin);      gets(NS);
    cout<<"Que quan: ";     fflush(stdin);      gets(QUEQUAN);
    cout<<"Nganh: ";        fflush(stdin);      gets(NGANH);
    cout<<"Nam TN: ";       cin>>NAMTN;
}
void KYSU::XUAT()
{
    cout<<"Ho ten: "<<HOTEN<<endl;
    cout<<"Ngay sinh: "<<NS<<endl;
    cout<<"Que quan: "<<QUEQUAN<<endl;
    cout<<"Nganh: "<<NGANH<<endl;
    cout<<"Nam TN: "<<NAMTN<<endl<<endl;
}
void IN(KYSU *a, int n)
{
    int MAX=0;
    for(int i=0; i<n; i++)
        if(a[i].NAMTN > MAX) MAX = a[i].NAMTN;
    cout<<"SV TN GAN DAY NHAT:"<<endl;
    for(int i=0; i<n; i++)
        if(a[i].NAMTN==MAX) a[i].XUAT();
}
int main()
{
    KYSU *a; int n;
    cout<<"n="; cin>>n;             //n=so ky su
    a = new KYSU[n];
    for(int i=0; i<n; i++)
        a[i].NHAP();
    IN(a, n);
    return 0;
}
```

BÀI 4.2. PRINTER

```
class PRINTER
```

```
{
protected:
    float TRONGLUONG;
    char HANGSX[20];
    int NAMSX;
    int TOCDO;
};
class DOTPRINTER : public PRINTER
{
    int MATDOKIM;
public:
    void NHAP();
    void XUAT();
};
class LASERPRINTER : public PRINTER
{
    int DOPHANGIAI;
public:
    void NHAP();
    void XUAT();
};
void DOTPRINTER::NHAP()
{
    cout<<"Trong Luong: ";      cin>>TRONGLUONG;
    cout<<"Hang SX ";           fflush(stdin);      gets(HANGSX);
    cout<<"Nam SX: ";           cin>>NAMSX;
    cout<<"Toc do: ";           cin>>TOCDO;
    cout<<"Mat do kim: ";       cin>>MATDOKIM;
}
void DOTPRINTER::XUAT()
{
    cout<<"Trong Luong: "<<TRONGLUONG<<endl;
    cout<<"Hang SX "<<HANGSX<<endl;
    cout<<"Nam SX: "<<NAMSX<<endl;
    cout<<"Toc do: "<<TOCDO<<endl;
    cout<<"Mat do kim: "<<MATDOKIM<<endl<<endl;
}
void LASERPRINTER::NHAP()
{
    cout<<"Trong Luong: ";      cin>>TRONGLUONG;
    cout<<"Hang SX ";           fflush(stdin);      gets(HANGSX);
    cout<<"Nam SX: ";           cin>>NAMSX;
    cout<<"Toc do: ";           cin>>TOCDO;
    cout<<"Do phan giai: ";     cin>>DOPHANGIAI;
}
void LASERPRINTER::XUAT()
{
    cout<<"Trong Luong: "<<TRONGLUONG<<endl;
    cout<<"Hang SX "<<HANGSX<<endl;
    cout<<"Nam SX: "<<NAMSX<<endl;
```

```
    cout<<"Toc do: "<<TOCDO<<endl;
    cout<<"Do phan giai: "<<DOPHANGIAI<<endl<<endl;
}
int main()
{
    DOTPRINTER a; LASERPRINTER b;
    cout<<"Nhap thong tin may in KIM:"<<endl;
    a.NHAP();
    cout<<"Nhap thong tin may in LASER:"<<endl;
    b.NHAP();
    cout<<endl<<"May in Kim vua nhap:"<<endl;
    a.XUAT();
    cout<<"May in Laser vua nhap:"<<endl;
    b.XUAT();
    return 0;
}
```

BÀI 4.3. VEHICLE

```
class VEHICLE
{
protected:
    char NHANHIEU[20];
    int  NAMSX;
    char HANGSX[20];
public:
    void NHAP();
    void XUAT();
};
class OTO : public VEHICLE
{
    int SOCHO;
    float DUNGTICH;
public:
    void NHAP();
    void XUAT();
};
class MOTO : public VEHICLE
{
    int PHANKHOI;
public:
    void NHAP();
    void XUAT();
};
void VEHICLE::NHAP()
{
    cout<<"Nhan hieu: ";        fflush(stdin);      gets(NHANHIEU);
    cout<<"Nam SX: ";           cin>>NAMSX;
    cout<<"Hang SX ";           fflush(stdin);      gets(HANGSX);
}
```

```
void VEHICLE::XUAT()
{
    cout<<"Nhan hieu: "<<NHANHIEU<<endl;
    cout<<"Nam SX: "<<NAMSX<<endl;
    cout<<"Hang SX "<<HANGSX<<endl;
}
void OTO::NHAP()
{
    VEHICLE::NHAP();
    cout<<"So cho: ";           cin>>SOCHO;
    cout<<"Dung tich: ";        cin>>DUNGTICH;
}
void OTO::XUAT()
{
    VEHICLE::XUAT();
    cout<<"So cho: "<<SOCHO<<endl;
    cout<<"Dung tich: "<<DUNGTICH<<endl<<endl;
}
void MOTO::NHAP()
{
    VEHICLE::NHAP();
    cout<<"Phan khoi: ";        cin>>PHANKHOI;
}
void MOTO::XUAT()
{
    VEHICLE::XUAT();
    cout<<"Phan khoi: "<<PHANKHOI<<endl;
}
int main()
{
    OTO a; MOTO b;
    cout<<"Nhap thong tin OTO:"<<endl;
    a.NHAP();
    cout<<"Nhap thong tin MOTO:"<<endl;
    b.NHAP();
    cout<<endl<<"OTO vua nhap:"<<endl;
    a.XUAT();
    cout<<"MOTO vua nhap:"<<endl;
    b.XUAT();
    return 0;
}
```

BÀI 4.4. CONSTRUCTOR/ DESTRUCTOR INHERITANCE

```
class ELECTRONIC
{
protected:
    float CONGSUAT;
    int   DIENAP;
public:
```

```
    ELECTRONIC(float a, int b);
};
class MAYGIAT : public ELECTRONIC
{
    float DUNGTICH;
    char LOAI[20];
public:
    MAYGIAT(float a, int b, float c, char*d);
    void XUAT();
};
class TULANH : public ELECTRONIC
{
    float DUNGTICH;
    int SONGAN;
public:
    TULANH(float a, int b, float c, int d);
    void XUAT();
};
void MAYGIAT::XUAT()
{
    cout<<"Cong suat: "<<CONGSUAT<<endl;
    cout<<"Dien ap  : "<<DIENAP<<endl;
    cout<<"Dung tich: "<<DUNGTICH<<endl;
    cout<<"Loai:      "<<LOAI<<endl<<endl;
}
void TULANH::XUAT()
{
    cout<<"Cong suat: "<<CONGSUAT<<endl;
    cout<<"Dien ap  : "<<DIENAP<<endl;
    cout<<"Dung tich: "<<DUNGTICH<<endl;
    cout<<"So ngan:   "<<SONGAN<<endl<<endl;
}
ELECTRONIC::ELECTRONIC(float a, int b)
{
   CONGSUAT = a;
   DIENAP   = b;
}
MAYGIAT::MAYGIAT(float a, int b, float c, char*d):ELECTRONIC(a,b)
{
    DUNGTICH = c;
    strcpy(LOAI, d);
}
TULANH::TULANH(float a, int b, float c, int d):ELECTRONIC(a,b)
{
    DUNGTICH = c;
    SONGAN   = d;
}
int main()
{
    MAYGIAT a(200, 220, 8, "CUA TRUOC");
```

```
    TULANH  b(150, 220, 150, 4);
    cout<<"Thong tin may giat:"<<endl;
    a.XUAT();
    cout<<"Thong tin tu lanh:"<<endl;
    b.XUAT();
    return 0;
}
```

BÀI O2.1. PRODUCT

```
class DATE
{
    int D, M, Y;
public:
    void NHAP();
    void XUAT();
    friend class TIVI;
};
class NSX
{
    char TENNSX[20];
    char DCNSX[20];
public:
    void NHAP();
    void XUAT();
    friend class HANG ;
};
class HANG
{
protected:
    char TENHANG[20];
    NSX x;
    float DONGIA ;
public:
    void NHAP();
    void XUAT();
    HANG() ;
};
class TIVI : public HANG
{
    float KICHTHUOC;
    DATE NGAYNHAP;
public:
    void NHAP();
    void XUAT();
    TIVI();
};
HANG::HANG()
{
     strcpy(TENHANG,  "");
     strcpy(x.TENNSX, "");
```

```
      strcpy(x.DCNSX,  "");
      DONGIA = 0;
}
TIVI::TIVI():HANG()
{
      KICHTHUOC = 0;
      NGAYNHAP.D = NGAYNHAP.M = NGAYNHAP.Y = 0;
}

void DATE::NHAP()
{
    cout<<"Ngay : ";     cin>>D;
    cout<<"Thang: ";     cin>>M;
    cout<<"Nam:   ";     cin>>Y;
}
void DATE::XUAT()
{
    cout<<D<<"/"<<M<<"/"<<Y;
}
void NSX::NHAP()
{
    cout<<"Ten NSX: ";       fflush(stdin);  gets(TENNSX);
    cout<<"Dia chi: ";       fflush(stdin);  gets(DCNSX);
}
void NSX::XUAT()
{
    cout<<"Ten NSX: "<<TENNSX<<endl;
    cout<<"Dia chi: "<<DCNSX<<endl;
}
void HANG::NHAP()
{
    cout<<"Ten hang: ";      fflush(stdin);  gets(TENHANG);
    x.NHAP();
    cout<<"Don gia:  ";      cin>>DONGIA;
}
void HANG::XUAT()
{
    cout<<"Ten hang: "<<TENHANG<<endl;
    x.XUAT();
    cout<<"Don gia : "<<DONGIA<<endl ;
}
void TIVI::NHAP()
{
    HANG::NHAP();
    cout<<"Kich thuoc: ";    cin>>KICHTHUOC;
    NGAYNHAP.NHAP();
}
void TIVI::XUAT()
{
    HANG::XUAT();
```

```
    cout<<"Kich thuoc: "<<KICHTHUOC<<endl;
    NGAYNHAP.XUAT();
}
int main()
{
    TIVI P;
    P.NHAP();
    cout<<"Thong tin TIVI vua nhap:"<<endl;
    P.XUAT();
    return 0;
}
```

BÀI O2.2. STUDENT

```
class SCHOOL
{
    char NAME[20];
    char DATE[20];
    friend class FACULTY;
};
class FACULTY
{
    char NAME[20];
    char DATE[20];
    SCHOOL x;
public:
    void INPUT();
    void OUTPUT();
};
class PERSON
{
protected:
    char NAME[20];
    char BIRTH[20];
    char ADDRESS[20];
public:
    void INPUT();
    void OUTPUT();
};
class STUDENT : private PERSON
{
    FACULTY y;
    char CLASS[20];
    float SCORE;
public:
    void INPUT();
    void OUTPUT();
};
void FACULTY::INPUT()
{
```

```
    cout<<"Faculty name: ";     fflush(stdin);  gets(NAME);
    cout<<"Faculty Date: ";     fflush(stdin);  gets(DATE);
    cout<<"SCHOOL:"<<endl;
    cout<<"School name:  ";     fflush(stdin);  gets(x.NAME);
    cout<<"School Date:  ";     fflush(stdin);  gets(x.DATE);
}
void FACULTY::OUTPUT()
{
    cout<<"Faculty name: "<<NAME<<endl;
    cout<<"Faculty Date: "<<DATE<<endl;
    cout<<"SCHOOL:"<<endl;
    cout<<"School name:  "<<x.NAME<<endl;
    cout<<"School Date:  "<<x.DATE<<endl;
}
void PERSON::INPUT()
{
    cout<<"Name: ";     fflush(stdin);  gets(NAME);
    cout<<"Birth:";     fflush(stdin);  gets(BIRTH);
    cout<<"Address: ";  fflush(stdin);  gets(ADDRESS);
}
void PERSON::OUTPUT()
{
    cout<<"Name:    "<<NAME<<endl;
    cout<<"Birth:   "<<BIRTH<<endl;
    cout<<"Address: "<<ADDRESS<<endl;
}
void STUDENT::INPUT()
{
    PERSON::INPUT();
    y.INPUT();
    cout<<"Class: ";        fflush(stdin);      gets(CLASS);
    cout<<"Score: ";        cin>>SCORE;
}
void STUDENT::OUTPUT()
{
    PERSON::OUTPUT();
    y.OUTPUT();
    cout<<"Class: "<<CLASS<<endl;
    cout<<"Score: "<<SCORE<<endl<<endl;
}
int main()
{
    STUDENT a;
    a.INPUT();
    cout<<endl;
    a.OUTPUT();
    return 0;
}
```

BÀI O2.3. SCHOOL

```
class KHOA
{
    char MAKHOA[20];
    char TENKHOA[20];
    char TRUONGKHOA[20];
    friend class TRUONGDH;
};
class BAN
{
    char MABAN[20];
    char TENBAN[20];
    char NGAYTL[20];
    friend class TRUONGDH;
};
class TRUONG
{
protected:
    char MATRUONG[20];
    char TENTRUONG[20];
    char NGAYTL[20];
public:
    void NHAP();
    void XUAT();
};
class TRUONGDH : private TRUONG
{
    KHOA *x;
    int n; //so khoa
    BAN *y;
    int m; //so ban
public:
    void NHAP();
    void XUAT();
};
void TRUONG::NHAP()
{
    cout<<"Ma truong: ";    fflush(stdin);      gets(MATRUONG);
    cout<<"Ten truong: ";   fflush(stdin);      gets(TENTRUONG);
    cout<<"Ngay TL: ";      fflush(stdin);      gets(NGAYTL);
}
void TRUONG::XUAT()
{
    cout<<"TRUONG: "<<endl;
    cout<<"Ma truong:  "<<MATRUONG<<endl;
    cout<<"Ten truong: "<<TENTRUONG<<endl;
    cout<<"Ngay TL:    "<<NGAYTL<<endl;
}
```

```
void TRUONGDH::NHAP()
{
    TRUONG::NHAP();
    cout<<"Nhap so khoa: "; cin>>n;
    x=new KHOA[n];
    for(int i=0; i<n; i++)
    {
        cout<<"Nhap khoa thu "<<i+1<<endl;
        cout<<"Ma khoa:  ";     fflush(stdin); gets(x[i].MAKHOA);
        cout<<"Ten khoa: ";     fflush(stdin); gets(x[i].TENKHOA);
        cout<<"Truong khoa: ";  fflush(stdin); gets(x[i].TRUONGKHOA);
    }
    cout<<"Nhap so ban: ";  cin>>m;
    y=new BAN[m];
    for(int i=0; i<m; i++)
    {
        cout<<"Nhap ban thu "<<i+1<<endl;
        cout<<"Ma ban:  ";     fflush(stdin);      gets(y[i].MABAN);
        cout<<"Ten ban: ";     fflush(stdin);      gets(y[i].TENBAN);
        cout<<"Ngay TL: ";     fflush(stdin);      gets(y[i].NGAYTL);
    }
}
void TRUONGDH::XUAT()
{
    TRUONG::XUAT();
    for(int i=0; i<n; i++)
    {
        cout<<"Khoa thu "<<i+1<<endl;
        cout<<"Ma khoa:  "<<x[i].MAKHOA<<endl;
        cout<<"Ten khoa: "<<x[i].TENKHOA<<endl;
        cout<<"Truong khoa: "<<x[i].TRUONGKHOA<<endl<<endl;
    }
    for(int i=0; i<m; i++)
    {
        cout<<"Ban thu "<<i+1<<endl;
        cout<<"Ma ban:  "<<y[i].MABAN<<endl;
        cout<<"Ten ban: "<<y[i].TENBAN<<endl;
        cout<<"Ngay TL: "<<y[i].NGAYTL<<endl<<endl;
    }
}
int main()
{
    TRUONGDH a;
    a.NHAP();
    cout<<endl;
    a.XUAT();
    return 0;
}
```

BÀI O2.4. COUPON

```
class HANG
{
    char TENHANG[20];
    float DONGIA;
    int SOLUONG;
public:
    void NHAP();
    void XUAT();
    friend class PHIEUMUAHANG;
};
class PHIEUMUAHANG
{
    char MAPHIEU[20];
    char NGAYLAP[20];
    HANG *x;
    int n;
public:
    void NHAP();
    void XUAT();
};
void HANG::NHAP()
{
    cout<<"Ten hang: ";     fflush(stdin);      gets(TENHANG);
    cout<<"Don gia:  ";     cin>>DONGIA;
    cout<<"So luong: ";     cin>>SOLUONG;
}
void HANG::XUAT()
{
     cout<<setw(20)<<TENHANG<<setw(10)<<DONGIA<<setw(10)<<SOLUONG<<
     setw(10)<<DONGIA*SOLUONG<<endl;
}
void PHIEUMUAHANG::NHAP()
{
    cout<<"Ma phieu: ";     fflush(stdin);      gets(MAPHIEU);
    cout<<"Ngay lap: ";     fflush(stdin);      gets(NGAYLAP);
    cout<<"Nhap so mat hang: ";                 cin>>n;
    x=new HANG[n];
    for(int i=0; i<n; i++)
        x[i].NHAP();
}
void PHIEUMUAHANG::XUAT()
{
    cout<<"Ma phieu: "<<MAPHIEU<"       ";
    cout<<"Ngay lap: "<<NGAYLAP<<endl;
    cout<<setw(20)<<"TEN HANG"<<setw(10)<<"DON GIA"<<setw(10)<<
    "SO LUONG"<<setw(10)<<"THANH TIEN"<<endl;
    for(int i=0; i<n; i++)
        x[i].XUAT();
```

```
    double TONGTIEN=0;
    for(int i=0; i<n; i++) TONGTIEN += x[i].DONGIA*x[i].SOLUONG;
    cout<<setw(50)<<"Cong thanh tien: "<<TONGTIEN<<endl;
}
int main()
{
    PHIEUMUAHANG a;
    a.NHAP();
    a.XUAT();
    return 0;
}
```

BÀI 5.1. FRACTION

```
class PS
{
    int TS, MS;
public:
    PS operator+(PS y);
    PS operator-(PS y);
    PS operator*(PS y);
    PS operator/(PS y);
    double operator-();    //tinh gia tri PS
    friend istream&operator>>(istream& x, PS& y);
    friend ostream&operator<<(ostream& x, PS y);
};
PS PS::operator+(PS y)
{
    PS tg;
    tg.TS = TS*y.MS + MS*y.TS;
    tg.MS = MS*y.MS;
    return tg;
}
PS PS::operator-(PS y)
{
    PS tg;
    tg.TS = TS*y.MS - MS*y.TS;
    tg.MS = MS*y.MS;
    return tg;
}
PS PS::operator*(PS y)
{
    PS tg;
    tg.TS = TS*y.TS;
    tg.MS = MS*y.MS;
    return tg;
}
PS PS::operator/(PS y)
{
    PS tg;
```

```
    tg.TS = TS*y.MS;
    tg.MS = MS*y.TS;
    return tg;
}
double PS::operator-()
{
    return (double) TS/MS;
}
istream& operator>>(istream& x, PS& y)
{
    cout<<"Nhap tu so:  ";      x>>y.TS;
    cout<<"Nhap mau so: ";      x>>y.MS;
    return x;
}
ostream& operator<<(ostream& x, PS y)
{
    x<<y.TS<<"/"<<y.MS;
    return x;
}
int main()
{
    PS a, b;
    cout<<"Nhap phan so thu nhat: "<<endl;    cin>>a;
    cout<<"Nhap phan so thu 2: "<<endl;       cin>>b;
    PS T=a+b;
    PS H=a-b;
    PS TICH   = a*b;
    PS THUONG = a/b;
    //Chú ý: #include "fstream"
    ofstream f("TENFILE.txt", ios::app);
    f<<a<<" + "<<b<<" = "<<T<<" = "<<-T<<endl;
    f<<a<<" - "<<b<<" = "<<H<<" = "<<-H<<endl;
    f<<a<<" * "<<b<<" = "<<TICH<<" = "<<-TICH<<endl;
    f<<a<<" : "<<b<<" = "<<THUONG<<" = "<<-THUONG<<endl;
    f.close();
    //Neu muon xuất màn hình, thay f bằng cout
    //Đọc dữ liệu từ tệp, in ra màn hình (kỹ thuật đọc từng dòng)
     ifstream f1("TENFILE.txt", ios::in);
     char S[200];
     while(!f1.eof())
     {
          f1.getline(S, 200);
          cout<<S<<endl;
     }
    f1.close();
    return 0;
}
```

BÀI 5.2. COMPLEX NUMBER

```
class SP
{
    float THUC, AO;
public:
    SP();                               //hàm tạo không đối
    SP(float x, float y);               //hàm tạo có đối
    friend ostream& operator<<(ostream& x, SP y);
    SP operator+(SP y);
    SP operator-(SP y);
};
SP::SP()
{
    THUC = AO = 0;
}
SP::SP(float x, float y)
{
    THUC=x; AO=y;
}
ostream&operator<<(ostream& x, SP y)
{
    x<<y.THUC<<" + i*"<<y.AO;
    return x;
}
SP SP::operator+(SP y)
    SP tg;
    tg.THUC = THUC + y.THUC;
    tg.AO   = AO   + y.AO;
    return tg;
}
SP SP::operator-(SP y)
{
    SP tg;
    tg.THUC = THUC - y.THUC;
    tg.AO   = AO   - y.AO;
    return tg;
}
int main()
{
    SP P1(3, 5);
    SP P2(2, 4);
    SP P3=P1+P2;
    SP P4=P1-P2;
    //XuatTep: ofstream f("Tentep.txt", ios::out);
    //if(f.good())
    cout<<"So phuc P1: "<<P1<<endl;
    cout<<"So phuc P2: "<<P2<<endl;
    cout<<"P1+P2:      "<<P3<<endl;
    cout<<"P1-P2:      "<<P4<<endl;
    return 0;
```

```
}
```

BÀI 5.3. TRINOMIAL

```
class TAMTHUC
{
    float a, b, c;
public:
  TAMTHUC();
  TAMTHUC(float x, float y, float z);
  TAMTHUC operator+(TAMTHUC y);
  TAMTHUC operator-(TAMTHUC y);
  TAMTHUC operator-();
  friend ostream& operator<<(ostream& x, TAMTHUC y);
};
TAMTHUC::TAMTHUC()
{
    a=b=c=0;
}
TAMTHUC::TAMTHUC(float x, float y, float z)
{
    a=x; b=y; c=z;
}
TAMTHUC TAMTHUC::operator+(TAMTHUC y)
{
    TAMTHUC tg;
    tg.a=a+y.a;
    tg.b=b+y.b;
    tg.c=c+y.c;
    return tg;
}
TAMTHUC TAMTHUC::operator-(TAMTHUC y)
{
    TAMTHUC tg;
    tg.a=a-y.a;
    tg.b=b-y.b;
    tg.c=c-y.c;
    return tg;
}
TAMTHUC TAMTHUC::operator-()
{
    TAMTHUC tg;
    tg.a=-a;
    tg.b=-b;
    tg.c=-c;
    return tg;
//Cách 2
//   a=-a;
//   b=-b;
//   c=-c;
//   return *this;
```

```
}
ostream& operator<<(ostream& x, TAMTHUC y)
{
    x<<y.a<<" X"<<(char)253;
    if (y.b>=0)     x<<" + "<<y.b<<" X ";
    else            x<<" - "<<-y.b<<" X ";
    if(y.c>=0)      x<<" + "<<y.c;
    else            x<<" - "<<-y.c;
    return x;
}
int main()
{
    TAMTHUC x(2,5,4), y(1,4,2);
    x=-x;b
    y=-y;
    ofstream f("Tên tệp.txt", ios::out);
    f<<"Tam thuc x da dao dau: "<<x<<endl;
    f<<"Tam thuc y da dao dau: "<<y<<endl;
    TAMTHUC T=x+y;
    TAMTHUC H=x-y;
    f<<"Tam thuc TONG: "<<T<<endl;
    f<<"Tam thuc HIEU: "<<H<<endl;
    f.close();
    return 0;
}
```

BÀI 5.4. MATRIX

```
class MATRIX
{
    int n, m;
    double **a;
public:
  friend ostream& operator<<(ostream& x, MATRIX y);
  friend istream& operator>>(istream& x, MATRIX& y);
  MATRIX operator+(MATRIX y);
  MATRIX operator-(MATRIX y);
  MATRIX operator-();
};
istream& operator>>(istream& x, MATRIX& y)
{
    cout<<"n=";     x>>y.n;
    cout<<"m=";     x>>y.m;
    y.a=new double*[y.n];
    for(int i=0; i<y.n; i++)
        y.a[i]=new double[y.m];
    for(int i=0; i<y.n; i++)
    for(int j=0; j<y.m; j++)
    {
        cout<<"a["<<i<<"]["<<j<<"]=";
```

```
            x>>y.a[i][j];
        }
        return x;
}
ostream& operator<<(ostream& x, MATRIX y)
{
        for(int i=0; i<y.n; i++)
        {
            for(int j=0; j<y.m; j++)
                x<<y.a[i][j]<<" ";
            x<<endl;
        }
        return x;
}
MATRIX MATRIX::operator+(MATRIX y)
{
        MATRIX tg;
        if(m==y.m && n==y.n)
        {
            tg.n=n; tg.m=m;
            tg.a=new double*[n];
            for(int i=0; i<n; i++)
                tg.a[i]=new double[m];
            for(int i=0; i<n; i++)
            for(int j=0; j<m; j++)
            tg.a[i][j]=a[i][j]+y.a[i][j];
        }
        else
        {
            cout<<"Hai ma tran khong cung kich thuoc !"<<endl;
            tg.n=tg.m=0;
            //tg.a =NULL;
        }
        return tg;
}
MATRIX MATRIX::operator-(MATRIX y)
{
        MATRIX tg;
        if(m==y.m && n==y.n)
        {
            tg.n=n; tg.m=m;
            tg.a=new double*[n];
            for(int i=0; i<n; i++)
                tg.a[i]=new double[m];
            for(int i=0; i<n; i++)
            for(int j=0; j<m; j++)
            tg.a[i][j]=a[i][j]-y.a[i][j];
        }
        else
        {
```

```
            cout<<"Hai ma tran khong cung kich thuoc !"<<endl;
            tg.n=tg.m=0;
        }
        return tg;
}
MATRIX MATRIX::operator-()
{
        for(int i=0; i<n; i++)
        for(int j=0; j<m; j++)
        a[i][j]=-a[i][j];
        return *this;
}
int main()
{
        MATRIX P, Q;
        cout<<"Nhap ma tran P:"<<endl;
        cin>>P;
        cout<<"Nhap ma tran Q:"<<endl;
        cin>>Q;
        P=-P;   Q=-Q;
        cout<<"Ma tran da doi dau P:"<<endl;
        cout<<P;
        cout<<"Ma tran da doi dau Q:"<<endl;
        cout<<Q;
        MATRIX M = P+Q;
        MATRIX N = P-Q;
        cout<<"Ma tran tong: "<<endl;
        cout<<M;
        cout<<"Ma tran hieu: "<<endl;
        cout<<N;
        return 0;
}
```

BÀI O3.1. SKILL

```
class ARRAY
{
        float *a;
        int n;
public:
        ARRAY operator++();
        ARRAY operator--();
        friend ostream& operator<<(ostream& x, ARRAY y);
        friend istream& operator>>(istream& x, ARRAY& y);
};
ARRAY ARRAY::operator++()
{
        for(int i=0; i<n; i++)
        for(int j=i+1; j<n; j++)
        if(a[i]>a[j])
```

```
    {
        float tg = a[i]; a[i]=a[j]; a[j]=tg;
    }
    return *this;
}
ARRAY ARRAY::operator--()
{
    for(int i=0; i<n; i++)
    for(int j=i+1; j<n; j++)
    if(a[i]<a[j])
    {
        float tg = a[i]; a[i]=a[j]; a[j]=tg;
    }
    return *this;
}
istream& operator>>(istream& x, ARRAY& y)
{
    cout<<"n="; x>>y.n;
    y.a = new float[y.n];
    for(int i=0; i<y.n; i++)
    {
        cout<<"a["<<i<<"]=";
        x>>y.a[i];
    }
    return x;
}
ostream& operator<<(ostream& x, ARRAY y)
{
    for(int i=0; i<y.n; i++)
        x<<y.a[i]<<" ";
    return x;
}
int main()
{
    ARRAY x; ofstream f("D:/MANG.txt", ios::out);
    cout<<"Nhap mang x:"<<endl;
    cin>>x;
    x=++x;
    cout<<"Mang x da sap tang: "<<endl;
    cout<<x<<endl;   f<<x<<endl;
    x=--x;
    cout<<"Mang x da sap giam:"<<endl;
    cout<<x<<endl;   f<<x<<endl;
    f.close();
    return 0;
}
```

BÀI O3.2. IN OUT

```
class TAMGIAC
{
```

```
    float a,b,c;
public:
    float operator!();
    friend istream & operator>>(istream& x, TAMGIAC & y);
    friend ostream& operator<<(ostream& x, TAMGIAC y);
};

float TAMGIAC::operator!()
{
    return a+b+c;
}
istream & operator>>(istream& x, TAMGIAC & y)
{
    x>>y.a;
    x>>y.b;
    x>>y.c;
    return x;
}
ostream& operator<<(ostream& x, TAMGIAC y)
{
    x<<"a="<<y.a<<endl;
    x<<"b="<<y.b<<endl;
    x<<"c="<<y.c<<endl;
    x<<"CV: "<<!y<<endl;
    return x;
}
int main()
{
    TAMGIAC P, Q;
    cout<<"NHAP TAM GIAC P:"<<endl; cin>>P;
    cout<<"NHAP TAM GIAC Q:"<,endl; cin>>Q;
    ofstream f("INOUT.TXT", ios::app);
    f<<P<<endl;
    f<<Q<<endl;
    f.close();
    return 0;
}
```

BÀI O3.3. MATRIX TEMPLATE

```
template <class T> class MATRIX
{
    int n, m;
    T **a;
public:
    void nhap();
    void xuat();
    MATRIX operator!();
};
```

```
template <class T> void MATRIX<T>::nhap()
{
    cout<<"n="; cin>>n;
    cout<<"m="; cin>>m;
    a = new T*[n];
    for(int i=0; i<n; i++)
        a[i]=new T[m];
    for(int i=0; i<n; i++)
    for(int j=0; j<m; j++)
    {
        cout<<"a["<<i<<"]["<<j<<"]=";
        cin>>a[i][j];
    }
}

template <class T> void MATRIX<T>::xuat()
{
    for(int i=0; i<n; i++)
    {
        for(int j=0; j<m; j++)
            cout<<setw(4)<<a[i][j];
        cout<<endl;
    }
}
template <class T> MATRIX<T> MATRIX<T>::operator!()
{
    MATRIX TG;
    TG.n = m;
    TG.m = n;
    TG.a = new T*[TG.n];
    for(int i=0; i<TG.n; i++)
        TG.a[i] = new T[TG.m];

    for(int i=0; i<TG.n; i++)
    for(int j=0; j<TG.m; j++)
    TG.a[i][j] = a[j][i];

    return TG;
}
int main()
{
    MATRIX<double> P;
    P.nhap();
    P = !P;
    P.xuat();
    MATRIX<long> Q;
    Q.nhap();
    Q = !Q;
    Q.xuat();
}
```