

## BÀI 1.1. STUDENT CLASS

```
class SINHVIEN
```

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

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

```
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<<setw(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 2.1. START

```

class PTB2
{
    float a, b, c;
public:
    void NHAP();
    void XUAT();
    void GIAI();
};

void PTB2::NHAP()
{
    cout<<"Nhap cac he so cua phuong trinh: "<<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;
        }
    }
}

int main()
{
    PTB2 x;
    x.NHAP();
    x.XUAT();
    x.GIAI();
    return 0;
}

```

## **BÀI 2.2. CONTINUE**

```

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 2.3. 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 2.4. SKILL

### class DOANHNGHIEP

```

{
    char    TENDN[20];
    char    DCDN[20];
    int     SNV;
    double   DOANHTHU;
public:
    void NHAP();
    void XUAT();
};

void DOANHNGHIEP::NHAP()
{
    cout<<"Ten DN:      ";      fflush(stdin);      gets(TENDN);
    cout<<"Dia chi DN: ";      fflush(stdin);      gets(DCDN);
    cout<<"So nhan vien: ";      cin>>SNV;
    cout<<"Doanh thu:  ";      cin>>DOANHTHU;
}

void DOANHNGHIEP::XUAT()
{
    cout<<"Ten DN:  "<<TENDN<<endl;
    cout<<"Dia chi: "<<DCDN<<endl;
    cout<<"So NV:   "<<SNV<<endl;
    cout<<"Doanh thu: "<<DOANHTHU<<endl;
}

int main()
{
    DOANHNGHIEP *x; int n;
    cout<<"n="; cin>>n;    x=new DOANHNGHIEP[n];
    for(int i=0; i<n; i++) x[i].NHAP();
    cout<<endl<<"Doanh nghiep vua nhap:"<<endl;
    for(int i=0; i<n; i++) x[i].XUAT();
    return 0;
}

```

## BÀI 2.5. COMPLEX

### class OTO

```

{
    char    MAOTO[20];

```

```

        float    GIAMUA;
        int      NAMSD;
        double   TYLEKHAUHAO;
public:
    void NHAP();
    void XUAT();
};
void OTO::NHAP()
{
    cout<<"Ma OTO:      ";      fflush(stdin);      gets(MAOTO);
    cout<<"Gia mua moi:";      cin>>GIAMUA;
    cout<<"So nam sd:  ";      cin>>NAMSD;
    cout<<"Ty Le Khau Hao:  ";  cin>>TYLEKHAUHAO;
}
void OTO::XUAT()
{
    cout<<setw(15)<<MAOTO<<setw(10)<<GIAMUA<<setw(10)<<NAMSD
    <<setw(10)<<TYLEKHAUHAO;

    double GT=GIAMUA;
    for(int i=0; i<NAMSD; i++) GT=GT-GT*TYLEKHAUHAO;
    cout<<setw(15)<<fixed<<GT<<endl ;
}
int main()
{
    int n ; cout<<"n= "; cin>>n ;
    OTO *x = new OTO[n];
    for(int i=0 ; i<n ; i++)
        x[i].NHAP();
    cout<<endl<<"Cac OTO vua nhap:"<<endl;
    for(int i=0 ; i<n ; i++)
        x[i].XUAT();
    return 0;
}

```

---

### BÀI 3.1. 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 3.2. 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 3.3. 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 3.4. 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 4.1. 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 4.2. 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:     "<<TENGHANG<<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 4.3. 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 TENGHANG[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(TENGHANG);
    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:     "<<TENGHANG<<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 4.4. 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 4.5. 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 5.1. COUPON**

```

class NCC
{
    char MANCC[10];
    char TENNCC[20];
    char DCNCC[20];
public:
    void NHAP();
    void XUAT();
};
class HANG
{
    char TENHANG[20];
    float DONGIA;
    int SOLUONG;
public:
    void NHAP();
    void XUAT();
}

```

```

        friend class PHIEU;
};
class PHIEU
{
    char MAPHIEU[20];
    char NGAYLAP[20];
    NCC y;
    HANG *x;
    int n;
public:
    void NHAP();
    void XUAT();
};
void NCC::NHAP()
{
    cout<<"Ma NCC: ";      fflush(stdin);      gets(MANCC);
    cout<<"Ten NCC: ";      fflush(stdin);      gets(TENNCC);
    cout<<"DC NCC: ";      fflush(stdin);      gets(DCNCC);
}
void NCC::XUAT()
{
    cout<<"Ma NCC: ";<<setw(15)<<MANCC;
    cout<<setw(15)<<"Ten NCC: ";<<setw(15)<<TENNCC<<endl;
    cout<<"DC NCC: ";<<DCNCC<<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 PHIEU::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 PHIEU::XUAT()
{
    cout<<setw(40)<<"PHIEU NHAP HANG"<<endl;
    cout<<"Ma phieu: ";<<setw(15)<<MAPHIEU;

```

```

        cout<<setw(15)<<"Ngày 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()
    {
        PHIEU a;
        a.NHAP();
        a.XUAT();
        return 0;
    }

```

---

## BÀI 5.2. TRANSCRIPT

```

class SINHVIEN
{
    char MASV[20];
    char TENSX[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 PHIEU;
};
class PHIEU
{
    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: "<<TENSX<<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 PHIEU::NHAP()
{
    x.NHAP();
    cout<<"Nhap so mon: ";      cin>>n;
    y=new MON[n];
    for(int i=0; i<n; i++)
        y[i].NHAP();
}
void PHIEU::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()
{
    PHIEU a;
    a.NHAP();
    a.XUAT();
    return 0;
}

```

---

### BÀI 5.3. INVENTORY

```

class PHIEU;
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 PHIEU;
    friend void SUA(PHIEU a);
    friend void SAP(PHIEU a);
};
class PHIEU
{
    char MAPH[20];
    char NGAYKK[20];
    NHANVIEN x;
    PHONG y;
    TAISAN *z;
    int n;
public:
    void NHAP();
    void XUAT();
}

```

```

        friend void SUA(PHIEU a);
        friend void SAP(PHIEU a);

};

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 PHIEU::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 PHIEU::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;
}

```

---

#### **Bonus 1:**

**void SUA(PHIEU a)**

```

{
    for(int i=0; i<a.n; i++)
        if(strcmp(a.z[i].TENTS, "May vi tinh")==0)
            a.z[i].SOLUONGTS = 20;
}

```

#### **Bonus 2:**

**void SAP(PHIEU a)**

```

{
    for(int i=0; i<a.n; i++)
        for(int j=i+1; j<a.n; j++)
            if(a.z[i].SOLUONGTS > a.z[j].SOLUONGTS)
            {
                TAISAN tg = a.z[i];
                a.z[i] = a.z[j];
                a.z[j] = tg;
            }
}

```

**int main()**

```

{
    PHIEU a;
    a.NHAP();
    a.XUAT(); SUA(a); SAP(a); a.XUAT();
    return 0;
}

```



## BÀI 6.1. 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 6.2. 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 6.3. 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;
}

```

```

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 7.1. 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 7.2. 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 7.3. SCHOOL

```

class KHOA
{
    char MAKHOA[20];
    char TENKHOA[20];
    char TRUONGKHOA[20];
    friend class TRUONGGDH;
};

class BAN
{
    char MABAN[20];
    char TENBAN[20];
    char NGAYTL[20];
    friend class TRUONGGDH;
};

class TRUONG
{
protected:
    char MATRUONG[20];
    char TENTRUONG[20];
    char NGAYTL[20];
public:
    void NHAP();
    void XUAT();
};

class TRUONGGDH : 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 7.4. HOSPITAL

```

class BENHNNHAN;
class NGUOI
{
protected:
    char HT[30];
    int TUOI;
public:
    void nhap();
    void xuat();
    friend void COUNT(BENHNNHAN *K, int n);
};

void NGUOI::nhap()
{
    cout<<"Ho ten: "; fflush(stdin); gets(HT);
    cout<<"Tuoi   : "; cin>>TUOI;
}

void NGUOI::xuat()
{
    cout<<"Ho ten: "<<HT<<". Tuoi: "<<TUOI<<endl;
}

class BENHVIEN
{
    char TENBV[30];
    char DCBV[30];
    NGUOI GD;
    friend class BENHNNHAN;
};

class BENHNNHAN:public NGUOI
{
    char MA[30];
    char TIENSU[30];
    char CHANDOAN[30];
    BENHVIEN x;
public:
    void nhap();
    void xuat();
    friend void UPDATE(BENHNNHAN *K, int n);
};

void BENHNNHAN::nhap()
{

```

```

        cout<<"MA BN:      "; fflush(stdin); gets(MA);
        NGUOI::nhap();
        cout<<"TIEN SU:    "; fflush(stdin); gets(TIENSU);
        cout<<"CHUAN DOAN:"; fflush(stdin); gets(CHANDOAN);
        cout<<"TEN BV:     "; fflush(stdin); gets(x.TENBV);
        cout<<"DC BV :     "; fflush(stdin); gets(x.DCBV);
        cout<<"Giam doc Benh Vien: "<<endl;
        x.GD.nhap();
    }
    void BENHNNHAN::xuat()
    {
        cout<<"MA BN:      "<<MA<<endl;
        NGUOI::xuat();
        cout<<"TIEN SU:    "<<TIENSU<<endl;
        cout<<"CHUAN DOAN:"<<CHANDOAN<<endl;
        cout<<"TEN BV:     "<<x.TENBV<<endl;
        cout<<"DC BV :     "<<x.DCBV<<endl;
        cout<<"Giam doc benh vien:"<<endl;
        x.GD.xuat();
        cout<<endl;
    }
    Bonus 1:
    void COUNT(BENHNNHAN *K, int n)
    {
        int d=0;
        for(int i=0; i<n; i++)
            if(K[i].TUOI>30) d++;
        cout<<"SO BN LON HON 30 TUOI: "<<d<<endl;
    }
    Bonus 2:
    void UPDATE(BENHNNHAN *K, int n)
    {
        for(int i=0; i<n; i++)
            if(strcmp(K[i].MA,"BN01")==0)
                K[i].TUOI = 20;
    }
    int main()
    {
        BENHNNHAN *K; int n;
        cout<<"n="; cin>>n;
        K = new BENHNNHAN[n];
        for(int i=0; i<n; i++)
            K[i].nhap();
        for(int i=0; i<n; i++)
            K[i].xuat();
        COUNT(K, n);
        UPDATE(K, n);
        for(int i=0; i<n; i++)
            K[i].xuat();
    }

```

## BÀI 8.1. 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 nhât: "<<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 8.2. 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 8.3. 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 8.4. 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 8.5. 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;
    cout<<"Nhap mang x:"<<endl;
    cin>>x;
    x=++x;
    cout<<"Mang x da sap tang: "<<endl;
    cout<<x<<endl;
    x=--x;
    cout<<"Mang x da sap giam:"<<endl;
    cout<<x<<endl;
    return 0;
}

```