Chuong 2

//Bai 1

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

void Inputarr(int *a, int n){
        for (int i=0; i<n; i++){
                cin >> *(a+i);
        }
}
void Outputarr (int *a, int &n){
        for (int i=0; i<n; i++){
                cout << *(a+i)<< " ";
        }
        cout << endl;
}
//Cau a
void deletetext (int *a, int &n, int k){
        if (k>= 0&&k<n){
                for (int i=k; i<n-1; i++){
                        *(a+i)= *(a+i+1);
                }           n--;
        } else {
                cout << "Vi tri khong hop le\n";
        }
}
```

```cpp
//Cau b
void Inserttext (int *a, int &n, int k){
        cout << "Nhap vi tri can chen: ";
        cin >> k;
        k=k-1;
        int x;
        cout << "Nhap ki tu can chen ";
        cin >> x;
        if (k<0 || k>n){
                cout << "Loi ";
                return;
        }
        for (int i=n-1; i>= k; i--)
                *(a+i+1)= *(a+i);
         *(a+k)=x;
        n++;
}


Cau c
bool CheckPrime (int num) {
   if (num< 2)
   return false;
        for (int i=2 ; i<= sqrt(num); i++){
        if (num%i==0){
                return false;
                }
        }
        return true;
}
```

```cpp
void DeletePrimes(int* a, int &n) {
    int i=0;
        while (i< n){
        if (CheckPrime( *(a+i))){
                deletetext(a, n, i);
                }
                else {
                        i++;
                }
        }
}


int main () {
        int n, k;
        cout << "Nhap so luong ki tu ";
        cin >> n;
        int *a= new int[n];
        cout << "Nhap mang ";
        Inputarr (a, n);
        cout << "Chuoi truoc khi xoa ";
        Outputarr (a, n);
        // Cau a
        cout << "k= ";
        cin >> k;
        k=k-1;
        deletetext (a, n, k);
        cout << "Chuoi sau khi xoa: ";
        Outputarr (a, n);
```

```cpp
        //Cau b
        cout << "Chuoi sau khi chen: ";
        Inserttext (a, n, k);
        Outputarr (a, n);
        //Cau c
        cout <<"Chuoi sau khi xoa so nguyen to: ";
        DeletePrimes (a, n);
        Outputarr (a, n);



        delete [] a;
        return 0;
}
```

//Bai 2

```cpp
#include <bits/stdc++.h>

using namespace std;

struct Information{
    long long mssv;
    string HovaTen;
    float dmcb;
    float dmcn1;
    float dmcn2;
};
//Cau a
void Input(Information *infor, int n) {
    for (int i = 0; i < n; i++) {
```

```cpp
        cout << "Nhap thong tin sinh vien thu " << i+1 << endl;

        cout << "Nhap ma so sinh vien: ";

        cin >> (infor + i)->mssv;

        cin.ignore();

        cout << "Nhap Ho va Ten: ";

        getline(cin, (infor + i)->HovaTen);

        cout << "Nhap diem mon co ban: ";

        cin >> (infor + i)->dmcb;

        cout << "Nhap diem mon chuyen nganh 1: ";

        cin >> (infor + i)->dmcn1;

        cout << "Nhap diem mon chuyen nganh 2: ";

        cin >> (infor + i)->dmcn2;

        cout << "\n";

    }

    cout << endl;

}

//Cau b

void Output (Information* &infor, int n){

    for (int i = 0; i < n; i++) {

        cout << "Thong tin sinh vien thu " << i+1 << endl;

        cout << "Ma so sinh vien: " << (infor + i)->mssv << "\n";

        cout << "Ho va Ten: " << (infor+i)->HovaTen << "\n";

        cout << "Diem mon co ban: " << (infor + i)->dmcb << "\n";

        cout << "Diem mon chuyen nganh 1: " << (infor + i)->dmcn1 << "\n";

        cout << "Diem mon chuyen nganh 2: " << (infor + i)->dmcn2 << "\n";

        cout << "Diem tong 3 mon: " << (infor+i)->dmcb+ (infor+i)->dmcn1+ (infor+i)->dmcn2 <<"\n";

        cout << "\n";

    }

    cout << endl;
```

```
}
//Cau c
void SearchSv(Information* infor, int n){
        bool found= false;
        for (int i=0; i<n; i++){
                if ((infor + i)->dmcb< 5.00|| (infor + i)->dmcn1 <5.00|| (infor + i)->dmcn2 <5.00){
                found= true;
    cout << "Ma so sinh vien: " << (infor + i)->mssv << "\n";
    cout << "Ho va Ten: " << (infor+i)->HovaTen << "\n";
    cout << "Diem mon co ban: " << (infor + i)->dmcb << "\n";
    cout << "Diem mon chuyen nganh 1: " << (infor + i)->dmcn1 << "\n";
    cout << "Diem mon chuyen nganh 2: " << (infor + i)->dmcn2 << "\n";
    cout << "Diem tong 3 mon: " << (infor+i)->dmcb+ (infor+i)->dmcn1+ (infor+i)->dmcn2 <<"\n";
    cout << "\n";
                }
                if (!found){
                        cout << "Khong tim thay!\n";
                }
        }
}


//Cau d
bool Checkmax(Information* infor, int n, float& diemmax, int& vtmax){ //vtmax: vi tri cua sinh vien co
diem lon nhat, diemmax: tong diem lon nhat
        diemmax= 0.00;
        vtmax=-1;
        for (int i=0; i< n; i++){
                //tongnow: tong diem hien tai
                int tong= (infor+ i)->dmcb+ (infor+ i)->dmcn1+ (infor+ i)->dmcn2;
```

```cpp
                if (tong> diemmax){

                        diemmax= tong;

                        vtmax= i;

                }

        }

        return diemmax> 0.00;

}




void SearchMax (Information *infor, int n){

        float diemmax;

        int vtmax;

                if(Checkmax(infor, n, diemmax, vtmax)){

                cout << "Thi sinh co diem ba mon lon nhat la"<< endl << endl;

                cout << "Ma so sinh vien: " << (infor + vtmax)->mssv << "\n";

        cout << "Ho va Ten: " << (infor+ vtmax)->HovaTen << "\n";

        cout << "Diem mon co ban: " << (infor + vtmax)->dmcb << "\n";

        cout << "Diem mon chuyen nganh 1: " << (infor + vtmax)->dmcn1 << "\n";

        cout << "Diem mon chuyen nganh 2: " << (infor + vtmax)->dmcn2 << "\n";

        cout << "Diem tong 3 mon: " << (infor+vtmax)->dmcb+ (infor+vtmax)->dmcn1+ (infor+ vtmax)-
>dmcn2 <<"\n";

        cout << "\n";

                } else {

                        cout << "Not found\n" << endl;

        }

}


//Cau e
void swap (int *a, int *b){
```

```cpp
        int *tmp;

        *tmp=*a;

        *a=*b;

        *b=*tmp;

}


void sapxep(Information* &infor, int n) {
  for (int i = 0; i < n - 1; i++) {
    bool swapped = false;
    for (int j = 0; j < n - i - 1; j++) {
      if ((infor + j)->dmcn1 + (infor + j)->dmcn2 > (infor + j + 1)->dmcn1 + (infor + j + 1)->dmcn2) {
        swap(*(infor + j), *(infor + j + 1));
        swapped = true;
      }
    }
    if (swapped == false) {
      break;
    }
  }
}


int main(){
    Information* infor;
    int n;
    cout << "Nhap so luong sinh vien: ";
    cin >> n;
    infor = new Information[n];
    //Cau a
    Input(infor, n);
```

```cpp
    cout << "\n==============================\n";

    //Cau b

    Output(infor, n);

    cout << "\n==============================\n";

    //Cau c

    cout << "Sinh vien duoi trung binh 1 mon\n ";

    SearchSv(infor, n);

    cout << "\n==============================\n";

    //Cau d

    SearchMax (infor, n);

    cout << "\n==============================\n";

    //Cau e

    int l, r;

    sapxep(infor, n);

    cout << "Chuoi sau khi sap xep\n ";

    Output (infor, n);


    delete[] infor;

    return 0;

}
```

// Bai 3

```cpp
#include <iostream>

#include <cmath>

using namespace std;


struct DonThuc {

 float heSo;

 int soMu;

};
```

```cpp
void nhapDaThuc(DonThuc* daThuc, int n) {
 for (int i = 0; i < n; i++) {
        cout << "Nhap da thuc thu " << i+1 << endl;
   cout << "Nhap he so cua don thuc thu " << i + 1 << ": ";
   cin >> daThuc[i].heSo;
   cout << "Nhap so mu cua don thuc thu " << i + 1 << ": ";
   cin >> daThuc[i].soMu;
   cout << endl;
 }
}


void tinhGiaTriDaThuc(const DonThuc* daThuc, float x, int n) {
 float giaTri=0;
 for (int i = 0; i < n; i++) {
   giaTri = daThuc[i].heSo * pow(x, daThuc[i].soMu)+ daThuc[i].heSo*x; //giaTri= heso* x^2 + heso* x
   cout << "Gia tri cua da thuc " << giaTri << endl;
 }
}



int main() {
 int n;
 cout << "Nhap so don thuc: ";
 cin >> n;

 DonThuc* daThuc = new DonThuc[n];
 nhapDaThuc(daThuc, n);
```

```cpp
    float x;

    cout << "Nhap gia tri x: ";

    cin >> x;


    tinhGiaTriDaThuc(daThuc, x, n);


    delete[] daThuc;


    return 0;
}
```

Chuong 3

Bai 1

```cpp
#include <bits/stdc++.h>

using namespace std;

bool islower(char c) {
        return c >= 'a' && c <= 'z';
}

bool isupper(char c) {
        return c >= 'A' && c <= 'Z';
}

char tolower(char c) {
        if (isupper(c)) {
```

```cpp
                return c + 32;
        }
        return c;
}


char toupper(char c) {
        if (islower(c)) {
                return c - 32;
        }
        return c;
}


//Câu a
void demKiTu(char a[]) {
  int cnthoa = 0;
  int cntthuong = 0;
  for (int i = 0; a[i] != '\0'; i++) {
    if (isupper(a[i])) {
      cnthoa++; //Tang so luong chu in hoa
    } else if (islower(a[i])){
      cntthuong++; // Tang so luong chu thuong
    }
  }
  cout << "So ki tu la chu hoa: " << cnthoa << endl;
  cout << "So ki tu la chu thuong: " << cntthuong << endl;
}


//Câu b
void ascii (char a[]){
```

```cpp
  for (int i=0; a[i] != '\0'; i++){
    cout << "Ma ascii cua " << a[i] << " la " << int (a[i]) /* ma ascii cua phan tu a[i] */ << endl;
  }
}


//Câu c
void chuyenkitu(char a[]) {
  for (int i = 0; a[i] != '\0'; i++) {
    //Chuyen ki tu dau tien thanh in hoa
    if (i == 0 || a[i - 1] == ' ') {
      a[i] = toupper(a[i]);
    } else {
      // Chuyen ki tu con lai thanh chu thuong
      a[i] = tolower(a[i]);
    }
  }
  cout << "Chuoi sau khi chuyen doi: ";
  cout << a;
}


//Cau d
int demsoluongtu (char a[]){
        int cnt=1; // dem so luonh tu
        for (int i=0; a[i] != '\0'; i++){
                if (a[i]== ' '){
                        cnt++;
                }
        }
        return cnt++;
```

```cpp
}


//Cau e
void dslkt (char* a) {
    int sokytu = 0; // dung de dem so ki tu trong tu
    bool trongtu = false; // xac nhan van con trong tu hay khong

    for (int i = 0; a[i] != '\0'; ++i) {
        if (a[i] != ' ') {
            ++sokytu;
            trongtu = true;
        } else if (trongtu) {
            cout << "So ky tu trong tu la: " << sokytu << endl;
            sokytu = 0;
            trongtu = false;
        }
    }

    if (trongtu) { // in ra so ki tu cua tu sau khoang trong
        cout << "So ky tu trong tu la: " << sokytu << endl;
    }
}

//Cau f
void timtu (char a[]) {
    int n = strlen(a);
    // gan bang -1 de danh dau chua tim thay ki tu khoang trong
    // khong gan bang 0 vi 0 cung la vi tri hop le trong chuoi gan co the se bi loi
    int dau_cach_dau = -1;
```

```cpp
    int dau_cach_cuoi = -1;

    // tim vi tri dau cach dau tien va dau cach cuoi cung
    for (int i = 0; i < n; ++i) {
        if (a[i] == ' ' && dau_cach_dau == -1) {
            dau_cach_dau = i;
        }
        if (a[i] == ' ') {
            dau_cach_cuoi = i;
        }
    }

    if (dau_cach_dau != -1 && dau_cach_cuoi != -1) {
        // in tu dau tien
        cout << "tu dau tien trong chuoi la: ";
        for (int i = 0; i < dau_cach_dau; ++i) {
            cout << a[i];
        }
        cout << "\n";

        // in tu cuoi cung
        cout << "tu cuoi cung trong chuoi la: ";
        for (int i = dau_cach_cuoi + 1; i < n; ++i) {
            cout << a[i];
        }
    }
    cout << endl;
}
```

```cpp
int main (){
 char a[100];
 int n;
 cout << "Nhap chuoi: ";
 cin.getline(a, 100);
 n = strlen(a);
 //Câu a
 demKiTu(a);
 cout << "\n====================\n";
 //Câu b
 ascii(a);
 cout << "\n====================\n";
 //Câu c
 chuyenkitu(a);
 cout << "\n====================\n";
 //Cau d
 int p= demsoluongtu(a);
 cout << "So luong tu cua chuoi la: " << p;
 cout << "\n====================\n";
 //Cau e
 dslkt (a);
 cout << "\n====================\n";
 //Cau f
 timtu (a);
 return 0;
}
```

//Bai 2

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

void nhapchuois(string &s) {
    getline(cin, s);
}

void nhapchuoix(string &x) {
    getline(cin, x);
}
// Cau a
int kiemtra(string s, string x) {
    //chay toi s.length - x.length de neu so ki tu chuoi s it hon x thi ko xet
    for (int i = 0; i <= s.length() - x.length(); ++i) {
        int j;
        for (j = 0; j < x.length(); ++j) {
            if (s[i + j] != x[j]) {
                break;
            }
        }
        if (j == x.length()) {
            return i; // Trả về vị trí đầu tiên của chuỗi x trong chuỗi s
        }
```

```cpp
    }
    return -1; // Không tìm thấy chuỗi x trong chuỗi s
}
void In (string s, string x){
        int result = kiemtra(s, x);
    if (result != -1) { // tim thay chuoi
        cout << "Chuoi x xuat hien tai vi tri: " << result << endl;
    } else {
        cout << "Khong tim thay chuoi x trong chuoi s." << endl;
    }
}
 //Cau b
int dem (string s, string x){
        int cnt=0;
        for (int i = 0; i <= s.length() - x.length(); ++i) {
    int j;
    for (j = 0; j < x.length(); ++j) {
      if (s[i + j] != x[j]) {
        break;
      }
    }
    if (j == x.length()) {
      cnt++;
    }
  }
  return cnt++;
}


void Incnt (string s, string x){
```

```cpp
        int p= dem(s, x);

        cout << "So lan xuat hien cua chuoi x la: " << p << endl;
}


int main() {
    string s, x;
    cout<<"Nhap chuoi s\n";
    nhapchuois(s);
    cout<<"Nhap chuoi x\n";
    nhapchuoix(x);
    //Cau a
    kiemtra (s, x);
    In (s, x);
    //Cau b
    dem(s, x);
    Incnt(s, x);
    return 0;
}
```

//Bai 3

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


void nhapchuois(string &s) {
    getline(cin, s);
}
//Cau a
void xoa(string s, int p, int l){
        if (p> s.length()|| p< 0)
```

```cpp
                cout << "Vi tri xoa khong hop le!\n";

        else

        for (int i=p; i< s.length(); i++){

                s[i]=s[i+l]; // gan phan tu thu i+l cho phan tu thu i

        }

        cout << "Chuoi sau khi xoa\n" << s << endl;

}
//Cau b
void nhapchuois1 (string &s1) { //Nhap chuoi s1

  getline(cin, s1);

}
void nhapchuois2 (string &s2) { // Nhap chuoi s2

  getline(cin, s2);

}
void chen (string s1, string s2, int p){

        // Tao chuoi tam de luu ket qua sau khi chen

        string temp;

        // Sao chep ki tu tu chuoi s1 den vi tri p

  for (int i = 0; i < p; i++) {

    temp.push_back(s1[i]);

  }

   // Chen chuoi b vào chuoi tom

  temp.append(s2);


  // Sao chep các ky tu tu vi tri p của chuoi a vao chuoi tam

  for (int i = p; i < s1.length(); i++) {

    temp.push_back(s1[i]);

  }
```

```cpp
    // Gan ket qua tu chuoi tam vao chuoi a
    s1 = temp;
    cout << "Chuoi sau khi chen\n" << s1;
}


int main (){
        string s;
        cout << "Nhap chuoi s\n";
        nhapchuois(s);
        //Cau a
        int p, l;
        cout << "Nhap vi tri can xoa "; cin >> p;
        cout << "Nhap so luong ki tu can xoa "; cin >> l;
        xoa (s, p, l);
        cout << "\n\n=====================\n\n";
        //Cau b
        string s1, s2;
        cout << "Nhap chuoi s1\n"; cin.ignore();
        nhapchuois1(s1);
        cout << "Nhap chuoi s2\n";
        nhapchuois1(s2);
        cout << "Nhap vi tri can chen "; cin >> p;
        chen(s1, s2, p);
        return 0;
}
```

Bai 4

```cpp
#include <iostream>
```

```cpp
using namespace std;

//kiem tra 2 chuoi giong nhau khong
bool kiemtra(string &s, int bd, string &x) {
    int lenx = x.size();
    for (int i = 0; i < lenx; i++) {
        if (s[bd + i] != x[i]) {
            return false;
        }
    }
    return true;
}

// thay x bang y trong s
void thaythechuoi(string &s, string &x, string &y) {
    int lens = s.size();
    int lenx = x.size();
    int leny = y.size();
    // kiem tra x trong s
    bool found = false;
    for (int i = 0; i <= lens - lenx; i++) {
        if (kiemtra(s, i, x)) {
            found = true;
            break;
        }
    }
```

```cpp
    if (!found) {
        cout << "Khong tim thay chuoi x trong chuoi s." << endl;
        return;
    }

    // thay x bang y
    string kq = "";
    for (int i = 0; i < lens;) {
        if (kiemtra(s,i,x)) {
            kq += y; //them y vao kq
            i += lenx; // di chuyen i qua moi x
        } else {
            kq += s[i]; // them ki tu tu s vao kq
            i++;
        }
    }
    cout << "Chuoi sau khi thay the la: " << kq << endl;
}

int main() {
    string s, x, y;
    cout << "Nhap chuoi S:";
    getline(cin, s);
    cout << "Nhap chuoi x: ";
    getline(cin, x);
    cout << "Nhap chuoi y: ";
    getline(cin, y);
```

```
    thaythechuoi(s, x, y);

    return 0;

}
```

Bai 5

```cpp
#include <bits/stdc++.h>

using namespace std;


void check (const string s[], int n){

        int cntw[7] = {0}; // dem so luong tu

        for (int i=0; i< n; i++){ // lap qua tung tu va gan cho x

                int cnt = s[i].length();// dem do dai tung tu

                cntw[cnt-1]++;

        }


        //vi tri nao xuat hien nhieu nhat

        int max = 0;

        for (int i=0; i<7; i++){

                if (cntw[i] > cntw[max]){

                        max = i;

                }

        }


        cout<<"Tu loai " << max+1 << " xuat hien nhieu nhat\n";

        cout <<"Xuat hien "<<cntw[max] << " lan";

}
int main(){

        int n;
```

```cpp
        cout << "Nhap so luong tu "; cin>>n;

        string s[n];

        for(int i=0; i<n; i++){

                cin>>s[i];

        }


        check (s, n);


        return 0;

}
```

Bai 6

```cpp
// Bai 6

#include <iostream>


using namespace std;


struct Sinhvien {

  int sobaodanh;

  string ho;

  string ten;

};


// Nhap thong tin sinh vien


void nhap (Sinhvien sinhvien[], int n){

        for (int i=0; i<n ;i++){

                cin.ignore();
```

```cpp
            cout << "Nhap thong tin sinh vien thu  " << i+1 << endl;

            cout << "Nhap so bao danh: ";

            cin >> sinhvien[i].sobaodanh;

            cin.ignore();

            cout << "Nhap ho: ";

            getline( cin, sinhvien[i].ho);

            cout << "Nhap ten: ";

            getline( cin, sinhvien[i].ten);

        }
}
  //Sap xep danh sach theo ten
void swap (int &a, int &b){

        int tmp= a;

        a=b;

        b= tmp;

}


void sapxep (Sinhvien sinhvien[], int n)
{
   int i, j;

   for (i = 0; i < n - 1; i++)

     for (j = 0; j < n - i - 1; j++)

        if (sinhvien[j].ten > sinhvien[j + 1].ten)

         swap(sinhvien[j], sinhvien[j + 1]);

}


//In danh sach sinh vien
```

```cpp
void In (Sinhvien sinhvien[], int n){

        cout << "\n================================\n";

        cout << "Danh sach sap xep theo ten:" << endl;

        for (int i = 0; i < n; i++) {

    cout << "Sinh vien thu " << i + 1 << endl;

    cout << "So bao danh: " << sinhvien[i].sobaodanh << endl;

    cout << "Ho va ten: " << sinhvien[i].ho << " " << sinhvien[i].ten << endl;

  }

}


int main() {

  int n;

  cout << "Nhap so luong sinh vien: ";

  cin >> n;

  Sinhvien *ds = new Sinhvien[n];

  nhap (ds, n);

  sapxep (ds, n);

  In (ds, n);


  delete[] ds;

  return 0;

}
```

Bai 7

```cpp
#include <bits/stdc++.h>

using namespace std;

struct Danhsachnhanvien{

        int manhanvien;
```

```cpp
        string hovaten;

        int ngaysinh;

        float luongcoban;

        float thuong;

        float thuclanh;

};


void nhap(Danhsachnhanvien nv[], int n){

        for (int i=0; i< n; i++){

                cout << "Nhap thong tin nhan vien thu " << i+1 << endl;

                cout << "Nhap ma nhan vien: ";

        cin >> nv[i].manhanvien;

        cin.ignore();

        cout << "Nhap ho va ten: ";

        getline(cin, nv[i].hovaten);

        cout << "Nhap ngay sinh: ";

        cin >> nv[i].ngaysinh;

        cout << "Nhap luong co ban: ";

        cin >> nv[i].luongcoban;

                cout << "Nhap thuong: ";

        cin >> nv[i].thuong;

        //tinh luong thuc lanh

        nv[i].thuclanh = nv[i].luongcoban + nv[i].thuong;

        }

}


void xuatt(Danhsachnhanvien nv[], int n){
```

```cpp
        cout << "Thong tin nhan vien" << endl;
        for (int i=0; i< n; i++){
                cout << "Ma nhan vien: ";
        cout << nv[i].manhanvien << endl;
        cout << "Ho va ten: ";
        cout << nv[i].hovaten<< endl;
        cout << "Ngay sinh: ";
        cout << nv[i].ngaysinh<< endl;
        cout << "Luong co ban: ";
        cout << nv[i].luongcoban<< endl;
                cout << "Thuong: ";
        cout << nv[i].thuong<< endl;
        //tinh luong thuc lanh
         cout << "Thuc lanh: " << nv[i].thuclanh << endl;
         cout << endl;
        }
        cout << endl;
}


void swap (int &a, int &b){
        int tmp;
        tmp=a;
        a=b;
        b=tmp;
}


void sapxep(Danhsachnhanvien nv[], int n)
```

```
{
    int i, j;
    bool swapped;
    for (i = 0; i < n - 1; i++) {
        swapped = false;
        for (j = 0; j < n - i - 1; j++) {
            if (nv[j].luongcoban < nv[j + 1].luongcoban) {
                swap(nv[j+1].luongcoban, nv[j].luongcoban);
                swapped = true;
            }
        }
        if (swapped == false)
            break;
    }
}

void sapxep2(Danhsachnhanvien nv[], int n)
{
    int i, j;
    bool swapped;
    for (i = 0; i < n - 1; i++) {
        swapped = false;
        for (j = 0; j < n - i - 1; j++) {
            if (nv[j].manhanvien > nv[j + 1].manhanvien) {
                swap(nv[j].manhanvien, nv[j+1].manhanvien);
                swapped = true;
            }
```

```cpp
        }
        if (swapped == false)
            break;
    }
}
int main(){
        int n;
        cout << "Nhap so luong nhan vien: "; cin >>n;
        Danhsachnhanvien nv[n];
        nhap(nv, n);
        cout << "\n\n============\n\n";
        xuatt(nv, n);
        sapxep (nv, n);
        cout << "\n\n== Sau khi sap xep theo luong ==\n\n";
        xuatt (nv, n);
        cout << "\n\n== Sau khi sap xep theo ma nhan vien==\n\n";
        sapxep2 (nv, n);
        xuatt (nv, n);

        return 0;
}
```

Bai 8

```cpp
#include <bits/stdc++.h>
using namespace std;


struct Thisinh {
```

```cpp
        string sobaodanh;

        string hovaten;

        float diemnn;

        float diemcb;

        float diemcs;

    };


void nhap(Thisinh ts[], int n){

        for (int i=0;i< n; i++){

                cout << "Nhap thong tin sinh vien thu " << i+1 << endl;

                cin.ignore();

                cout << "Nhap so bao danh: ";

                getline (cin, ts[i].sobaodanh);

                cout << "Nhap Ho va Ten: ";

                getline (cin, ts[i].hovaten);

                cout << "Nhap diem mon ngoai ngu: ";

                cin >> ts[i].diemnn;

                cout << "Nhap diem mon co ban: ";

                cin >> ts[i].diemcb;

                cout << "Nhap diem mon co so: ";

                cin >> ts[i].diemcs;

                cout << endl;

        }

}


void xuat(Thisinh ts[], int n){

        for (int i=0;i< n; i++){
```

```cpp
        cout << "Thong tin sinh vien thu " << i+1 << endl;

        cout << "So bao danh: ";

        cout << ts[i].sobaodanh << endl;

        cout << "Ho va Ten: ";

        cout << ts[i].hovaten << endl;

        cout << "Diem mon ngoai ngu ";

        cout << ts[i].diemnn << endl;

        cout << "Diem mon co ban: ";

        cout << ts[i].diemcb << endl;

        cout << "Diem mon co so: ";

        cout << ts[i].diemcs << endl;

        cout << endl;

    }

}

//Cau a

void timkiem(Thisinh ts[], int n){

    bool found= false; // kiem tra tim thay hay khong

    for (int i=0; i<n; i++){

        if(ts[i].diemnn< 5|| ts[i].diemcb< 5|| ts[i].diemcs< 5){

            found= true; // tim thay va in ra sinh vien da tim thay

        cout << "Sinh vien thu " << i+1 << " co diem thi be hon 5"<< endl;

        cout << "So bao danh: ";

        cout << ts[i].sobaodanh << endl;

        cout << "Ho va Ten: ";

        cout << ts[i].hovaten << endl;

        cout << "Diem mon ngoai ngu ";

        cout << ts[i].diemnn << endl;
```

```cpp
            cout << "Diem mon co ban: ";

            cout << ts[i].diemcb << endl;

            cout << "Diem mon co so: ";

            cout << ts[i].diemcs << endl;

            cout << endl;

            } if (!found){ // khong tim thay

                    cout << "Khong tim thay thi sinh!\n";

            }

        }

}


//Cau b
void dem(Thisinh ts[], int n){

        int cnt=0; // tao bien dem

        bool found= false;

        for (int i=0; i< n; i++){

                if (ts[i].diemnn>= 5&& ts[i].diemcb>= 5&& ts[i].diemcs>= 5&& ts[i].diemcb+
ts[i].diemcs>= 12){

                        cnt++;

                }

        }

        cout << "Co "<< cnt << " thi sinh thoa yeu cau\n";

}
// Cau c
// tim sinh vien co diemmax tai vtmax
bool Checkmax(Thisinh* ts, int n, float& diemmax, int& vtmax){ //vtmax: vi tri cua sinh vien co
diem lon nhat, diemmax: tong diem lon nhat

        diemmax= 0.00;
```

```cpp
        vtmax=-1;
        for (int i=0; i< n; i++){
                //tongnow: tong diem hien tai
                int tongnow= ts[i].diemnn+ ts[i].diemcb+ ts[i].diemcs;
                if (tongnow> diemmax){
                        diemmax= tongnow;
                        vtmax= i;
                }
        }
        return diemmax> 0.00;
}
//In ra thi sinh co tong lon nhat
void Inmax (Thisinh* ts, int n){
        float diemmax;
        int vtmax;
                if(Checkmax(ts, n, diemmax, vtmax)){
                cout << "Sinh vien thu co diem thi lon nhat la"<< endl << endl;
                cout << "So bao danh: ";
                cout << ts[vtmax].sobaodanh << endl;
                cout << "Ho va Ten: ";
                cout << ts[vtmax].hovaten << endl;
                cout << "Diem mon ngoai ngu ";
                cout << ts[vtmax].diemnn << endl;
                cout << "Diem mon co ban: ";
                cout << ts[vtmax].diemcb << endl;
                cout << "Diem mon co so: ";
                cout << ts[vtmax].diemcs << endl;
```

```cpp
                cout << endl;

            } else {

                cout << "No student found with valid scores!\n" << endl;

        }

}


//Cau d
void timdiemx(Thisinh ts[], int n) {

        string x;

    cout << "Nhap so bao danh can tim: ";

    cin.ignore();

    getline(cin, x);


    bool timed = false; // kiem tra tim thay khong

    for (int i = 0; i< n; i++) {

        if (x == ts[i].sobaodanh) {

            timed= true;

            cout << "Diem thi cua sinh vien can tim la:" << endl;

            cout << "Diem mon ngoai ngu: " << ts[i].diemnn << endl;

            cout << "Diem mon co ban: " << ts[i].diemcb << endl;

            cout << "Diem mon co so: " << ts[i].diemcs << endl;

            break;

        }

    }

    if (!timed) {

        cout << "So bao danh khong ton tai!\n";

    }
```

```
}
//Cau e
void swap (int &a, int &b){

        int tmp;

        tmp=a;

        a=b;

        b=tmp;

}


void sapxepsbd(Thisinh ts[], int n){

   int i, j;

   bool swapped;

   for (i = 0; i < n - 1; i++) {

      swapped = false;

      for (j = 0; j < n - i - 1; j++) {

         if (ts[j].sobaodanh > ts[j + 1].sobaodanh) {

            swap(ts[j].sobaodanh, ts[j + 1].sobaodanh);

            swapped = true;

         }

      }

      if (swapped == false)

         break;

   }

}


int main(){

        int n;
```

```cpp
    cout << "Nhap so luong thi sinh: "; cin >>n;
    Thisinh *ts= new Thisinh[n];
    nhap(ts, n);
    //Cau a;
    cout << "\n\n=========== Cau a =============\n\n";
    timkiem (ts, n);
    //Cau b
    cout << "\n\n=========== Cau b =============\n\n";
    dem (ts, n);
    //Cau c
    cout << "\n\n=========== Cau c =============\n\n";
    Inmax(ts, n);
    //Cau d
    cout << "\n\n=========== Cau d =============\n\n";
    timdiemx (ts, n);
    // Cau e
    cout << "\n\n=========== Cau e =============\n\n";
    sapxepsbd(ts, n);
    xuat(ts, n);

    delete[] ts;
    return 0;
}
```