

# Олимпиада СПбГУ по информатике 2022/23 учебного года

A	B	C	D	E	F	Sum
100	100	80	60	52	0	392

## Task A ()

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

#define int long long
#define VI vector<int>
#define ret return
#define fori(i,n) foriab(i,0,n)
#define foril(i,n) foriab(i,1,n)
#define foriab(i,a,b) for(int i=(a);i<(b);++i)
#define foris(i,n) fori(i,n.sz())
#define pb push_back
#define pp pop_back
#define sz size
#define endl '\n'
#define endlf endl<<flush
```

```
using namespace std;
```

```
signed main(){
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    VI v;
    fori(i,6){
        int x;
        cin>>x;
        --x;
        if(x==v.sz()){
            v.pb(i);
            continue;
        }
        VI vv;
        foris(j,v){
            if(j==x){
                vv.pb(i);
            }
            vv.pb(v[j]);
        }
        swap(v,vv);
    }
    VI vv(6);
    fori(i,6){
        vv[v[i]]=i+1;
    }
    fori(i,6){
        cout<<vv[i]<<'_';
    }
    cout<<endl;
    ret 0;
}
```

## Task B ()

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

#define int long long
#define VI vector<int>
#define ret return
#define fori(i,n) foriab(i,0,n)
#define foril(i,n) foriab(i,1,n)
#define foriab(i,a,b) for(int i=(a);i<(b);++i)
#define foris(i,n) fori(i,n.sz())
#define pb push_back
#define pp pop_back
#define sz size
#define endl '\n'
#define endlf endl<<flush
#define x first
#define y second
#define ANS(X) {cout<<(X)<<endl;ret;}
#define NO ANS("NO")
#define YES ANS("YES")
#define ZERO ANS(0)
#define NE1 ANS(-1)

using namespace std;

template<class T>istream& operator>>(istream& i,vector<T>& v){
    for(auto& x:v){
        i>>x;
    }
    ret i;
}

int sum(const VI& v){
    int s=0;
    for(auto x:v){
        s+=x;
    }
    ret s;
}

int n;
VI v;
void alice(){
    ANS(sum(v)<<10);
}

void bob(){
    int x=v[0]>>10;
    int s=x<<10;
    for(auto&vv:v){
        vv-=s;
    }
    ANS(x+sum(v));
}

signed main(){
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    string s;
    cin>>s>>n;
    v.resize(n);
    cin>>v;
    if(s[0]=='f'){
        alice();
    }else{
        bob();
    }
}
```

## Task C ()

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

#define int long long
#define VI vector<int>
#define ret return
#define fori(i,n) foriab(i,0,n)
#define foril(i,n) foriab(i,1,n)
#define foriab(i,a,b) for(int i=(a);i<(b);++i)
#define foris(i,n) fori(i,n.sz())
#define pb push_back
#define pp pop_back
#define sz size
#define endl '\n'
#define endlf endl<<flush
#define x first
#define y second
#define ANS(X) {cout<<(X)<<endl;ret;}
#define NO ANS("NO")
#define YES ANS("YES")
#define ZERO ANS(0)
#define NE1 ANS(-1)
#define wall(v) v.begin(),v.end()
#define PII pair<int,int>
#define VPII vector<PII>
#define x first
#define y second
#define SPII set<PII>
#define ins insert
#define era erase
#define VB vector<byte>
#define byte short
#define VVB vector<VB>

using namespace std;

template<class T,class U>istream& operator>>(istream& i,pair<T,U>& v){
    ret i>>v.x>>v.y;
}
template<class T,class U>ostream& operator<<(ostream& o,const pair<T,U>& v){
    ret o<<v.x<<' '<<v.y<<endl;
}
template<class T>istream& operator>>(istream& i,vector<T>& v){
    for(auto& x:v){
        i>>x;
    }
    ret i;
}
template<class T>ostream& operator<<(ostream& i,const vector<T>& v){
    for(const auto& x:v){
        i<<x<<' ';
    }
    ret i<<endl;
}
int sum(const VI& v){
    int s=0;
    for(auto x:v){
        s+=x;
    }
    ret s;
}
template<class t> void sort(vector<t>& v){
    sort(wall(v));
}
template<class t> void sort(pair<t,t>& p){
    if(p.y<p.x){
        swap(p.x,p.y);
    }
}
template<class t> vector<t> sorted(vector<t> v){
    sort(v);
    ret v;
}
```

```

}
template<class t> pair<t,t> sorted(pair<t,t> p){
    sort(p);
    ret p;
}
template<class T> vector<T>& operator+=(vector<T>& v, const vector<T>&vv){
    for(const auto& vvv:vv){
        v.pb(vvv);
    }
    ret v;
}
PII ch(PII x){
    ret {x.y,x.x};
}
VPPII get(PII a,PII b,PII c){
    VPPII ans;
    if(c.x<a.x){
        ret ans;
    }
    if(c.x<b.x){
        ret ans;
    }
    if(c.y<a.y){
        ret ans;
    }
    if(c.y<b.y){
        ret ans;
    }
    for(int ax:VI{0,c.x-a.x}){
        for(int ay:VI{0,c.y-a.y}){
            if(ax!=0&&ax!=c.x-a.x&&ay!=0&&ay!=c.y-a.y){
                continue;
            }
            VB line(c.x+2,0);
            line[0]=1;
            line[c.x+1]=1;
            VB fullline(c.x+2,1);
            VVB field(c.y+2,line);
            field[0]=fullline;
            field[c.y+1]=fullline;
            fori(i,a.x){
                fori(j,a.y){
                    field[1+ay+j][1+ax+i]=1;
                }
            }
            fori(bx,c.x-b.x+1){
                fori(by,c.y-b.y+1){
                    VVB tf=field;
                    fori(i,b.x){
                        if(field[by][1+bx+i]){
                            goto st1;
                        }
                    }
                    fori(i,b.x){
                        if(field[1+by+b.y][1+bx+i]){
                            goto st1;
                        }
                    }
                    goto end;
                st1:;
                fori(i,b.y){
                    if(field[1+by+i][bx]){
                        goto st2;
                    }
                }
                fori(i,b.y){
                    if(field[1+by+i][1+bx+b.x]){
                        goto st2;
                    }
                }
                goto end;
            st2:;
            fori(i,b.x){
                fori(j,b.y){

```



```

        ans.pb(a);
        ret ans;
    }
    if(a.x==b.x){
        ans.pb(a);
        ans.pb({a.x,b.y-a.y});
        ret ans;
    }
    if(a.y==b.y){
        ans.pb(a);
        ans.pb({b.x-a.x,a.y});
        ret ans;
    }
    ret ans;
}

void solve(){
    VPII dano(3);
    cin>>dano;
    for(auto& p:dano){
        sort(p);
    }
    sort(wall(dano),[](auto a,auto b){ret a.x*a.y<b.x*b.y;});
    VPII ans=dano;
    ans+=get(dano[0],dano[1],dano[2]);
    ans+=get(ch(dano[0]),dano[1],dano[2]);
    ans+=get(ch(dano[0]),ch(dano[1]),dano[2]);
    ans+=get(dano[0],ch(dano[1]),dano[2]);
    ans+=get(dano[1],dano[0],dano[2]);
    ans+=get(ch(dano[1]),dano[0],dano[2]);
    ans+=get(ch(dano[1]),ch(dano[0]),dano[2]);
    ans+=get(dano[1],ch(dano[0]),dano[2]);
    ans+=(in(dano[0],dano[1]));
    ans+=(in(ch(dano[0]),dano[1]));
    ans+=(in(dano[1],dano[2]));
    ans+=(in(ch(dano[1]),dano[2]));
    ans+=(in(dano[0],dano[2]));
    ans+=(in(ch(dano[0]),dano[2]));
    SPII s;
    for(auto p:ans){
        sort(p);
        s.ins(p);
    }
    for(auto p:s){
        cout<<p.x<<' ';<<p.y<<endl;
    }
}

signed main(){
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    solve();
}

```

## Task D ()

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

#define int long long
#define VI vector<int>
#define ret return
#define fori(i,n) foriab(i,0,n)
#define foril(i,n) foriab(i,1,n)
#define foriab(i,a,b) for(int i=(a);i<(b);++i)
#define foris(i,n) fori(i,n.sz())
#define pb push_back
#define pp pop_back
#define sz size
#define endl '\n'
#define endlf endl<<flush
#define x first
#define y second
#define ANS(X) {cout<<(X)<<endl;ret;}
#define NO ANS("NO")
#define YES ANS("YES")
#define ZERO ANS(0)
#define NE1 ANS(-1)
#define wall(v) v.begin(),v.end()
#define PII pair<int,int>
#define VPII vector<PII>
#define x first
#define y second
#define SPII set<PII>
#define ins insert
#define era erase
#define VB vector<byte>
#define byte short
#define VVB vector<VB>
#define SI set<int>

using namespace std;

template<class T,class U>istream& operator>>(istream& i,pair<T,U>& v){
    ret i>>v.x>>v.y;
}
template<class T,class U>ostream& operator<<(ostream& o,const pair<T,U>& v){
    ret o<<v.x<<' '<<v.y<<endl;
}
template<class T>istream& operator>>(istream& i,vector<T>& v){
    for(auto& x:v){
        i>>x;
    }
    ret i;
}
template<class T>ostream& operator<<(ostream& i,const vector<T>& v){
    for(const auto& x:v){
        i<<x<<' ';
    }
    ret i<<endl;
}
int sum(const VI& v){
    int s=0;
    for(auto x:v){
        s+=x;
    }
    ret s;
}
template<class t> void sort(vector<t>& v){
    sort(wall(v));
}
template<class t> void sort(pair<t,t>& p){
    if(p.y<p.x){
        swap(p.x,p.y);
    }
}
template<class t> vector<t> sorted(vector<t> v){
    sort(v);
```

```

        ret v;
    }
    template<class t> pair<t,t> sorted(pair<t,t> p){
        sort(p);
        ret p;
    }
    template<class T> vector<T>& operator+=(vector<T>& v, const vector<T>&vv){
        for(const auto& vv:vv){
            v.pb(vv);
        }
        ret v;
    }
}

VI vv;
map<VI, bool> mem;
bool get(VI pos, bool play=1){
    if(!play){
        if(mem.count(pos)){
            ret mem[pos];
        }
    }
    int n=pos.sz()/2;
    for(i,2*n){
        if(pos[i]){
            goto game;
        }
    }
    if(play){
        cout<<"-1_-1"<<endlf;
    }
    ret mem[pos]=0;
game:;
    for(i,n){
        if(pos[i]){
            VI pp=pos;
            do{
                --pp[i];
                if(get(pp,0)==0){
                    if(play){
                        cout<<i+1<<'_'<<pos[i]-pp[i]<<endlf;
                        pos[i]=pp[i];
                        int ti,tv;
                        cin>>ti>>tv;
                        if(ti==-1){
                            exit(0);
                        }
                        --ti;
                        if(tv){
                            pos[ti]-=tv;
                        }else{
                            pos[ti]=vv[ti];
                            pos[ti+n]=0;
                        }
                        ret get(pos,1);
                    }
                    ret mem[pos]=1;
                }
            }while(pp[i]);
        }
    }
    for(i,n){
        if(pos[i+n]){
            VI pp=pos;
            pp[i]=vv[i];
            pp[i+n]=0;
            if(get(pp,0)==0){
                if(play){
                    pos=pp;
                    cout<<i+1<<'_'<<pos[i]-pp[i]<<endlf;
                    int ti,tv;
                    cin>>ti>>tv;
                    if(ti==-1){
                        exit(0);
                    }
                }
            }
        }
    }
}

```



```

        --ti;
        if(tv){
            pos[ti]=tv;
        }else{
            pos[ti]=vv[ti];
            pos[ti+n]=0;
        }
        ret get(pos,1);
    }
    ret mem[pos]=1;
}

}

if(play){
    cout<<"-1_-1"<<endlf;
}
ret mem[pos]=0;
}

void solve(){
    int n;
    cin>>n;
    VI v(n);
    cin>>v;
    vv=v;
    fori(i,n){
        v.pb(1);
    }
    get(v,1);
}

signed main(){
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    solve();
}

```

## Task E ()

```
#pragma GCC optimize("Ofast")
#include <iostream>
#include <bits/stdc++.h>

#define int signed
#define VI vector<int>
#define ret return
#define fori(i,n) foriab(i,0,n)
#define foril(i,n) foriab(i,1,n)
#define foriab(i,a,b) for(int i=(a);i<(b);++i)
#define foris(i,n) fori(i,n.sz())
#define pb push_back
#define pp pop_back
#define sz size
#define endl '\n'
#define endlf endl<<flush
#define x first
#define y second
#define ANS(X) {cout<<(X)<<endl;ret;}
#define NO ANS("NO")
#define YES ANS("YES")
#define ZERO ANS(0)
#define NE1 ANS(-1)
#define wall(v) v.begin(),v.end()
#define PII pair<int,int>
#define VPPII vector<PII>
#define x first
#define y second
#define SPII set<PII>
#define ins insert
#define era erase
#define VB vector<byte>
#define byte short
#define VVB vector<VB>
#define SI set<int>
#define VS vector<string>
#define MII map<int,int>

using namespace std;

template<class T,class U>istream& operator>>(istream& i,pair<T,U>& v){
    ret i>>v.x>>v.y;
}
template<class T,class U>ostream& operator<<(ostream& o,const pair<T,U>& v){
    ret o<<v.x<<' '<<v.y<<endl;
}
template<class T>istream& operator>>(istream& i,vector<T>& v){
    for(auto& x:v){
        i>>x;
    }
    ret i;
}
template<class T>ostream& operator<<(ostream& i,const vector<T>& v){
    for(const auto& x:v){
        i<<x<<' ';
    }
    ret i<<endl;
}
int sum(const VI& v){
    int s=0;
    for(auto x:v){
        s+=x;
    }
    ret s;
}
template<class t> void sort(vector<t>& v){
    sort(wall(v));
}
template<class t> void sort(pair<t,t>& p){
    if(p.y<p.x){
        swap(p.x,p.y);
    }
}
```

```

}
template<class t> vector<t> sorted(vector<t> v){
    sort(v);
    ret v;
}
template<class t> pair<t,t> sorted(pair<t,t> p){
    sort(p);
    ret p;
}
template<class T> vector<T>& operator+=(vector<T>& v, const vector<T>&vv){
    for(const auto& vvv:vv){
        v.pb(vvv);
    }
    ret v;
}
int popcnt(int x){
    int _=0;
    while(x){
        _+=x%2;
        x/=2;
    }
    ret _;
}

VI i2m;
VI m2i;
void precalc(){
    m2i.resize(1<<20);
    fori(mask,1<<20){
        if(popcnt(mask)!=10){
            continue;
        }
        m2i[mask]=i2m.sz();
        i2m.pb(mask);
    }
}
VI m2a(int m){
    VI a;
    int cur=1;
    fori(x,20){
        if(m%2){
            a.pb(cur-1);
            cur=1;
        } else {
            ++cur;
        }
        m/=2;
    }
    a.pb(cur-1);
    ret a;
}
int a2m(const VI& a){
    int m=0;
    foris(i,a){
        int b=1+a[a.sz()-i-1];
        m<<=b;
        m^=1;
    }
    ret m/2;
}
void alice(){
    int n;
    cin>>n;
    int m=i2m[n];
    VI a=m2a(m);
    string s(10,'0');
    fori(i,11){
        if(i){
            s[i-1]='1';
        }
        fori(x,a[i]){
            cout<<s<<endl;
        }
    }
}

```

```

        }
        cout<<endl;
    }
    void bob() {
        VI a(11);
        for(i,10){
            string s;
            cin>>s;
            int c=0;
            for(auto x:s){
                c+=x-'0';
            }
            ++a[c];
        }
        cout<<m2i[a2m(a)]<<endl;
    }

    signed main() {
        ios_base::sync_with_stdio(0);
        cin.tie(0);
        cout.tie(0);
        precalc();
        int t;
        cin>>t;
        string s;
        cin>>s;
        while(t--){
            if(s[0]=='t'){
                alice();
            } else {
                bob();
            }
        }
    }
}

```

## Task F ()

```
a=int(input())  
b=int(input())  
print(a+b)
```