

Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	60	60	35	0	355

Task A (100)

```
n=int(input())
m=int(input())
import math

alfa=m/n
if (alfa%1!=0):
    print('No')
else:
    if (pow(2,math.log2(alfa))==alfa):
        print('Yes')
    else:
        print('No')
```

Task B (100)

```
#include <bits/stdc++.h>
using namespace std;
#define loop(i,n) for (i=1;i<=n;i++)
#define loopo(i,n) for (i=0;i<n;i++)

typedef long long ll;

int main()
{
    ios::sync_with_stdio(false);
    cin.tie(0);cout.tie(0);
    ll n,m,k,i,j,dop,dopi,ans=0,a,b;
    cin>>n;
    string c;
    cin>>c;

    i=0;
    while (i!=n)
    {
        if (c[i]=='o')
        {
            if (i<=n-1-1 && c[i+1]=='r')
            {
                cout<<"Yes";
                return(0);
            }
            else if (i<=n-2-1 && c[i+2]=='r')
            {
                cout<<"Yes";
                return(0);
            }
        }
        else if (c[i]=='r')
        {
            if (i<=n-1-1 && c[i+1]=='o')
            {
                cout<<"Yes";
                return(0);
            }
        }
        i++;
    }

    cout<<"No";
    return 0;
}
```

Task C (60)

```
// asasdd
#include <bits/stdc++.h>
using namespace std;
#define loop(i,n) for (i=1;i<=n;i++)
#define loopo(i,n) for (i=0;i<n;i++)

typedef long long ll;

vector <vector <int> > sosed;
vector <int> empty;
vector <int> was;
vector <pair <int ,int> > emm;
vector <vector <pair <int ,int> > > longer;

int n,m,k,i,j,dop,dopi,ans=0,a,b,maxi=1,maxi_pos=1;

void dfs(int now,int deep)
{
    int ii;
    loopo(ii,sosed[now].size())
        if (was[sosed[now][ii]]>deep+1)
        {
            was[sosed[now][ii]]=deep+1;
            if (deep+1>maxi)
            {
                maxi=deep+1;
                maxi_pos=sosed[now][ii];
            }
            dfs(sosed[now][ii],deep+1);
        }
}

int dfs2(int now,int deep)
{
    ll sumary=1;
    int ii;
    //cout<<"NOW"<<now<<' '<<sosed[now].size()<<endl;
    loopo(ii,sosed[now].size())
        if (was[sosed[now][ii]]==n+1)//deep+1
        {
            was[sosed[now][ii]]=deep+1;
            if (deep+1>maxi)
            {
                maxi=deep+1;
                maxi_pos=sosed[now][ii];
            }
            ll kek=dfs2(sosed[now][ii],deep+1);
            //cout<<"PUSHED"<<now<<endl;
            if (longer[now].size()==0)//<=sosed[now].size()
                longer[now].push_back(make_pair(sosed[now][ii],kek));
            else if (longer[now][0].second<kek)
                longer[now][0]=make_pair(sosed[now][ii],kek);

            sumary+=kek;
        }
    return (sumary);
}

int main()
{
    ios::sync_with_stdio(false);
    cin.tie(0);cout.tie(0);

    cin>>n;

    sosed.assign(n+1,empty);
```

```

was.assign(n+1,n+1);
longer.assign(n+1,emm);

loop(i,n-1)
{
    cin>>a>>b;
    sosed[a].push_back(b);
    sosed[b].push_back(a);
}
//loopo(j,sosed[3].size())cout<<sosed[3][j];
was[1]=1;
dfs(1,1);

/*
maxi=-1;
was.clear();
was.assign(n+1,n+1);
dfs2(maxi_pos,1);
maxi=-1;

was.clear();
was.assign(n+1,n+1);
dfs2(maxi_pos,1);
*/
//loopo(j,longer[3].size())cout<<longer[3][j].first<<' '<<longer[3][j].second<<endl;
//cout<<endl;
vector<int> ok(n+1,0);

loop(i,n)
    if (sosed[i].size()==1 && ok[i]==0)
    {
        was.clear();
        was.assign(n+1,n+1);
        was[i]=1;
        //cout<<i<<endl;
        dfs2(i,1);
        int dad=sosed[i][0];
        loopo(j,sosed[dad].size())
            if (longer[sosed[dad][j]].size()==0 && ok[sosed[dad][j]]==0)
            {
                longer[sosed[dad][j]].push_back(make_pair(0,longer[i][0].second));
                ok[sosed[dad][j]]=1;
            }

            //else if (longer[sosed[dad][j]][0].second<longer[i][0].second)
            //    longer[sosed[dad][j]][0]=make_pair(0,longer[i][0].second);
    }
//loopo(j,longer[3].size())cout<<longer[3][j].first<<' '<<longer[3][j].second<<endl;
//cout<<endl;
loop(i,n)
{
    maxi=0;
    loopo(j,longer[i].size())
    {
        if (maxi<longer[i][j].second)
            maxi=longer[i][j].second;
        //cout<<"L"<<longer[i][j].second<<endl;
    }
    cout<<maxi+1<<'⌞';
}
return 0;
}

```

Task D (60)

```
c=input()
if (c=='split'):
    t,n,p=map(int,input().split())
    if (n==3)and(p==7):
        for alfa in range(t):
            pas=input()
            print('a'+pas[:6],end='_')
            print('b'+pas[3:],end='_')
            print('c'+pas[:3]+pas[6:])
    elif (n==5)and(p==7):
        for alfa in range(t):
            pas=input()
            print('a'+pas[:6],end='_');print('a'+pas[:6],end='_')
            print('b'+pas[3:],end='_');print('b'+pas[3:],end='_')
            print('c'+pas[:3]+pas[6:])
else:
    t,n,p=map(int,input().split())
    if (n in [3,5])and(p==7):
        for alfa in range(t):
            #pas=[0,0]
            pasi=['']*9
            pas=input().split()
            #print(pas)
            for i in range(n-n//2):
                if (pas[i][0]=='a'):
                    for now in range(1,7):
                        pasi[now-1]=pas[i][now]
                elif (pas[i][0]=='b'):
                    for now in range(1,7):
                        pasi[now+2]=pas[i][now]
            else:
                for now in range(1,4):
                    pasi[now-1]=pas[i][now]
                for now in range(4,7):
                    pasi[now+2]=pas[i][now]
            print(''.join(pasi))
```

Task E (35)

```
#include <bits/stdc++.h>
using namespace std;
#define loop(i,n) for (i=1;i<=n;i++)
#define loopo(i,n) for (i=0;i<n;i++)

typedef long long ll;

struct lel
{
    long double x;
    long double y;
    ll num;
};
long double px,py,qx,qy;

bool compa(lel aa,lel bb)
{
    if (aa.x!=bb.x)
        return (aa.x>bb.x);
    else
        return (aa.y>bb.y);
}

int main()
{
    ios::sync_with_stdio(false);
    cin.tie(0);cout.tie(0);
    long double n,m,k,i,j,dop,dopi,ans=0;
    long double a,b;

    vector<lel> in_max;
    vector<pair<long double,long double>> doper;
    doper.push_back(make_pair(0,0));

    cin>>n;
    loop(i,n)
    {
        cin>>a>>b;
        doper.push_back(make_pair(a,b));
    }

    cin>>px>>py>>qx>>qy;

    if (py!=qy)
    {
        long double maxi=-1;
        loop(i,n)
        {
            //cin>>a>>b;
            a=doper[i].first;b=doper[i].second;
            long double alfa,beta,zeta,p;
            alfa=sqrt(abs(b-py)*abs(b-py)+abs(a-px)*abs(a-px));
            beta=sqrt(abs(b-qy)*abs(b-qy)+abs(a-qx)*abs(a-qx));
            zeta=sqrt(abs(py-qy)*abs(py-qy)+abs(px-qx)*abs(px-qx));
            p=(alfa+beta+zeta)/2;
            //cout<<'Q'<<alfa<<' '<<beta<<' '<<zeta<<endl;
            long double S=sqrt(p*(p-alfa)*(p-beta)*(p-zeta));
            long double h=2*(S/zeta);
            long double demix=sqrt(alfa*alfa-h*h);
            long double cosi=zeta*zeta+alfa*alfa-beta*beta;
            if (cosi<0)
                demix=-demix;

            //cout<<'Q'<<demix<<' '<<h<<' '<<endl;

            if (demix>maxi || in_max.empty())
```

```

        {
            maxi=demix;
            in_max.clear();
            in_max.push_back({demix,h,i});
        }
        else if (demix==maxi)
            in_max.push_back({demix,h,i});
    }

}
else
{

    if (px<=qx)
    {
        long double maxi=-1000000001;
        loop(i,n)
        {
            //cin>>a>>b;
            a=doper[i].first;b=doper[i].second;
            if (a>maxi || in_max.empty())
            {
                maxi=a;
                in_max.clear();
                in_max.push_back({a,abs(b-py),i});
            }
            else if (a==maxi)
                in_max.push_back({a,abs(b-py),i});
        }
    }
    else
    {
        long double maxi=1000000001;
        loop(i,n)
        {
            //cin>>a>>b;
            a=doper[i].first;b=doper[i].second;
            if (a<maxi || in_max.empty())
            {
                maxi=a;
                in_max.clear();
                in_max.push_back({-a,abs(b-py),i});
            }
            else if (a==maxi)
                in_max.push_back({-a,abs(b-py),i});
        }
    }
}

sort(in_max.begin(),in_max.end(),compa);

ll len=in_max.size();
//loopo(i,len)cout<<in_max[i].x<<' '<<in_max[i].y<<endl;
if (len>1 && in_max[len-1].x==in_max[len-2].x && in_max[len-1].y==in_max[len-2].y)
    cout<<-1;
else
    cout<<in_max[len-1].num;

return 0;
}

```

Task F (—)