Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	60	21	0	381

Task A (100)

```cpp
#include <iostream>
#include <vector>
#include <string>
#include <array>
#include <set>
#include <queue>
#include <stdlib.h>

using namespace std;

int main()
{
    int n,m;
    cin>>n>>m;

    bool r = false;
    for(int i =0; (1<<i)<129; i++) {
        if(n*(1<<i)==m){
            r = true;
            cout<<"Yes";
        }
    }
    if(!r)
        cout<<"No";
    return 0;
}
```

Task B (100)

```cpp
#include <iostream>
#include <vector>
#include <string>
#include <array>
#include <set>
#include <queue>
#include <stdlib.h>

using namespace std;

int main()
{
    int l;
    cin>>l;
    string s;
    cin>>s;

    bool r = false;
    for(int i =0; i<l-1; i++) {
        if(s[i]=='o'&&s[i+1]=='r')
            r = true;
        if(s[i]=='r'&&s[i+1]=='o')
            r = true;
    }
    for(int i =0; i<l-2; i++) {
        if(s[i]=='o' && s[i+2]=='r') {
            r = true;
        }
    }
    if(r)
        cout<<"Yes";
    else
        cout<<"No";

    return 0;
}
```

Task C (100)

```cpp
#include <iostream>
#include <vector>
#include <string>
#include <array>
#include <set>
#include <queue>
#include <stdlib.h>
#include <unordered_set>
#include <map>

using namespace std;

static map<tuple<int,int>, int> mass;

//int getmass(int a, int head, vector<int> edg[], map<tuple<int,int>, int> mass) {
int getmass(int a, int head, vector<int> edg[]) {
    int sum =0;
    for(int i =0; i<edg[a].size(); i++) {
        if(edg[a][i]==head)
            continue;
        if(mass[tuple<int, int>(a,edg[a][i])]==0){
            //mass[tuple<int, int>(a,edg[a][i])] = getmass(edg[a][i],a,edg,mass);
            mass[tuple<int, int>(a,edg[a][i])] = getmass(edg[a][i],a,edg);
        }
        sum+=mass[tuple<int, int>(a,edg[a][i])];
    }
    return sum+1;
}
int main()
{

    int vert;
    cin>>vert;


    vector<int> edg[vert] = {};
    for(int i =0; i<vert-1; i++) {
        int a, b;
        cin>>a>>b;
        a--;
        b--;
        edg[a].push_back(b);
        edg[b].push_back(a);
    }
    //leaves
    unordered_set<int> leaves;
    //int mass[vert] = {};

    //map<tuple<int,int>, int> mass;

    for(int i =0; i<vert; i++) {
        if(edg[i].size()==1) {
            leaves.insert(i);
            mass[tuple<int, int>(edg[i][0],i)] = 1;
//            mass.insert(pair<tuple<int,int>, int>(tuple<int, int>(edg[i][0],i), 1));
            //mass.insert()
            //cout<<i<endl;
        }
    }
//    cout<<mass[tuple<int,int>(1,2)];




    for(int i =0; i<vert; i++) {
        if(leaves.find(i)!=leaves.end())
            cout<<vert<<"␣";
        else {
```

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```cpp
            int maxmass = 0;
            for(int n =0; n<edg[i].size(); n++) {
                if(mass[tuple<int,int>(i,edg[i][n])]==0){
                    //mass[tuple<int,int>(i,edg[i][n])]=getmass(edg[i][n],i,edg,mass);
                    mass[tuple<int,int>(i,edg[i][n])]=getmass(edg[i][n],i,edg);
                }
                if(mass[tuple<int,int>(i,edg[i][n])]>maxmass)
                    maxmass = mass[tuple<int,int>(i,edg[i][n])];
            }
            cout<<maxmass+1<<" ";
        }
    }
    //cout<<endl<<mass[tuple<int,int>(0,4)];


    return 0;
}
```

Task D (60)

```cpp
#include <iostream>
#include <vector>
#include <string>
#include <array>
#include <set>
#include <queue>
#include <stdlib.h>

using namespace std;

int main()
{
    string type;
    cin>>type;
    if(type=="split") {
        int oper, s, l;
        cin>>oper>>s>>l;
        if(s==7){
            for(int o =0; o<oper; o++) {
                string pw;
                cin>>pw;
                //a,b,c,g = raw info
                //d,e,f = delta

                cout<<"a"<<pw[0]<<pw[3]<<pw[6]<<"_";
                cout<<"b"<<pw[1]<<pw[4]<<pw[7]<<"_";
                cout<<"c"<<pw[2]<<pw[5]<<pw[8]<<"_";
                cout<<"d"<<(char)((26+pw[0]-pw[1])%26+'a')<<(char)((26+pw[3]-pw[4])%26+'a')<<(char
                    )((26+pw[6]-pw[7])%26+'a')<<"_";
                cout<<"e"<<(char)((26+pw[1]-pw[2])%26+'a')<<(char)((26+pw[4]-pw[5])%26+'a')<<(char
                    )((26+pw[7]-pw[8])%26+'a')<<"_";
                cout<<"f"<<(char)((26+pw[2]-pw[3])%26+'a')<<(char)((26+pw[5]-pw[6])%26+'a')<<(char
                    )((26+pw[8]-pw[0])%26+'a')<<"_";
                cout<<"g"<<(char)((26+pw[0]+pw[1]+pw[2])%26+'a')<<(char)((26+pw[3]+pw[4]+pw[5])
                    %26+'a')<<(char)((26+pw[6]+pw[7]+pw[8])%26+'a')<<"_";
                cout<<endl;


            }
        }
        if(s==3) {
            for(int o = 0; o<oper; o++) {
                string pw;
                cin>>pw;

                cout<<"a";
                for(int i =0; i<6; i++) {
                    cout<<pw[i];
                }
                cout<<"_";

                cout<<"b";
                for(int i =3; i<9; i++) {
                    cout<<pw[i];
                }
                cout<<"_";

                cout<<"c";
                for(int i =0; i<3; i++) {
                    cout<<pw[i];
                }
                for(int i =6; i<9; i++) {
                    cout<<pw[i];
                }
                cout<<endl;
            }
        }
        if(s==5) {
            for(int o = 0; o<oper; o++) {
                string pw;
```

```cpp
                cin>>pw;

                cout<<"a";
                for(int i =0; i<6; i++) {
                    cout<<pw[i];
                }
                cout<<" ";
                cout<<"a";
                for(int i =0; i<6; i++) {
                    cout<<pw[i];
                }
                cout<<" ";

                cout<<"b";
                for(int i =3; i<9; i++) {
                    cout<<pw[i];
                }
                cout<<" ";
                cout<<"b";
                for(int i =3; i<9; i++) {
                    cout<<pw[i];
                }
                cout<<" ";

                cout<<"c";
                for(int i =0; i<3; i++) {
                    cout<<pw[i];
                }
                for(int i =6; i<9; i++) {
                    cout<<pw[i];
                }
                cout<<endl;

            }
        }
    }
    else {
        int oper, s, l;
        cin>>oper>>s>>l;
        if(s==7){
            for(int o =0; o<oper; o++) {
                string r = "123456789";
                string inp[4] = {};
                cin>>inp[0]>>inp[1]>>inp[2]>>inp[3];
                for(int n =0; n<4; n++) {
                    if(inp[n][0]=='a'){
                        r[0] = inp[n][1];
                        r[3] = inp[n][2];
                        r[6] = inp[n][3];
                    }
                    if(inp[n][0]=='b'){
                        r[1] = inp[n][1];
                        r[4] = inp[n][2];
                        r[7] = inp[n][3];
                    }
                    if(inp[n][0]=='c'){
                        r[2] = inp[n][1];
                        r[5] = inp[n][2];
                        r[8] = inp[n][3];
                    }
                }
                for(int cyc =0; cyc<20; cyc++) {
                    for(int n =0; n<4; n++) {
                        if(inp[n][0]=='d'){
                            int k = 0;
                            for(int i =0; i<3; i++) {
                                if(r[0+k]>60&&r[(1+k)%9]<60) {
                                    r[(1+k)%9] = (char)((r[0+k]+10*26-inp[n][1+k/3])%26+'a');
                                }
                                if(r[0+k]<60&&r[1+k]>60) {
                                    r[0+k] = (char)((r[(1+k)%9]+10*26+inp[n][1+k/3]-2*'a')%26+'a')
                                            ;
                                }
                            }
                            k+=3;
```

```cpp
                }
            }
            if(inp[n][0]=='e'){
                int k = 1;
                for(int i =0; i<3; i++) {
                    if(r[0+k]>60&&r[(1+k)%9]<60) {
                        r[(1+k)%9] = (char)((r[0+k]+10*26-inp[n][1+k/3])%26+'a');
                    }
                    if(r[0+k]<60&&r[1+k]>60) {
                        r[0+k] = (char)((r[(1+k)%9]+10*26+inp[n][1+k/3]-2*'a')%26+'a')
                            ;
                    }
                    k+=3;
                }
            }
            if(inp[n][0]=='f'){
                int k = 2;
                for(int i =0; i<3; i++) {
                    if(r[0+k]>60&&r[(1+k)%9]<60) {
                        r[(1+k)%9] = (char)((r[0+k]+10*26-inp[n][1+k/3])%26+'a');
                    }
                    if(r[0+k]<60&&r[1+k]>60) {
                        r[0+k] = (char)((r[(1+k)%9]+10*26+inp[n][1+k/3]-2*'a')%26+'a')
                            ;
                    }
                    k+=3;
                }
            }
            if(inp[n][0] =='g'){
                int k = 0;
                for(int i =0; i<3; i++) {
                    if(r[0+k]>60&&r[(1+k)%9]<60&&r[(2+k)%9]>60) {
                        r[(1+k)%9] = (char)((inp[n][1+k/3]+26*10-r[(2+k)%9]-r[0+k])
                            %26+'a');
                    }
                    if(r[0+k]<60&&r[(1+k)%9]>60&&r[(2+k)%9]>60) {
                        r[k] = (char)((inp[n][1+k/3]+26*10-r[(2+k)%9]-r[(1+k)%9])%26+'
                            a');
                    }
                    if(r[0+k]>60&&r[(1+k)%9]<60&&r[(2+k)%9]>60) {
                        r[(2+k)%9] = (char)((inp[n][1+k/3]+26*10-r[(1+k)%9]-r[0+k])
                            %26+'a');
                    }

                    k+=3;
                }
            }
        }
    }
    cout<<r;
    }
}
if(s==3){
    for(int o =0; o<oper; o++) {
        string r = "123456789";

        for(int n =0; n<2; n++) {
            string inp;
            cin>>inp;
            if(inp[0]=='a'){
                for(int i =0; i<6; i++) {
                    r[i] = inp[i+1];
                }
            }
            if(inp[0]=='b'){
                for(int i =3; i<9; i++) {
                    r[i] = inp[i-2];
                }
            }

            if(inp[0]=='c'){
                for(int i =0; i<3; i++) {
                    r[i] = inp[i+1];
```

```cpp
                    }
                    for(int i =6; i<9; i++) {
                        r[i] = inp[i-2];
                    }
                }
            }
            cout<<r<<endl;
        }
    }
    if(s==5){
        for(int o =0; o<oper; o++) {
            string r = "123456789";

            for(int n =0; n<3; n++) {
                string inp;
                cin>>inp;
                if(inp[0]=='a'){
                    for(int i =0; i<6; i++) {
                        r[i] = inp[i+1];
                    }
                }
                if(inp[0]=='b'){
                    for(int i =3; i<9; i++) {
                        r[i] = inp[i-2];
                    }
                }

                if(inp[0]=='c'){
                    for(int i =0; i<3; i++) {
                        r[i] = inp[i+1];
                    }
                    for(int i =6; i<9; i++) {
                        r[i] = inp[i-2];
                    }
                }
            }
            cout<<r<<endl;
        }
    }
    }
    return 0;
}
```

```cpp
#include <iostream>
#include <vector>
#include <string>
#include <array>
#include <set>
#include <queue>
#include <stdlib.h>

using namespace std;

int main()
{
    int governs;
    cin>>governs;
    int coords[governs*2] = {};
    for(int i =0; i<governs; i++) {
        int a,b;
        cin>>a>>b;
        coords[i*2] = a;
        coords[i*2+1] = b;
    }
    int px,py,qx,qy;
    cin>>px>>py>>qx>>qy;
    /*
    if(px==qx) {
        if(qy>py){
            int maxc= 0;
            int maxy = -1000000000;
            for(int i = 0; i<governs; i++) {
                if(coords[i*2+1]>maxy){
                    maxy = coords[2*i+1];
                    maxc = i+1;
                }
            }
            cout<<maxc;
        }
        else {
            int maxc= 0;
            int maxy = 1000000000;
            for(int i = 0; i<governs; i++) {
                if(coords[i*2+1]<maxy){
                    maxy = coords[2*i+1];
                    maxc = i+1;
                }
            }
            cout<<maxc;
        }
    }
    if(py==qy) {
        if(qx>px) {
            int maxc =0;
            int maxx = -2000000000;
            for(int i =0; i<governs; i++) {
                if(coords[i*2]>maxx){
                    maxx = coords[2*i];
                    maxc = i+1;
                }
            }
            cout<<maxc;
        }
        else {
            int maxc =0;
            int maxx = 2000000000;
            for(int i =0; i<governs; i++) {
                if(coords[i*2]<maxx){
                    maxx = coords[2*i];
                    maxc = i+1;
                }
            }
        }
```

```cpp
                cout<<maxc;
            }
        }
    }
    */


    long double infx, infy;

    if(qx==px){
        infx = qx;
        if(qy>py)
            infy=100000000;
        else
            infy=-100000000;
    }
    else {
        //y=kx+m
        long double k = (qy-py)*1.0/(qx-px);
        long double m = py-px*k;

        if(qx>px) {
            infx = 100000000;
            infy = k*infx+m;
        }
        if(qx<px){
            infx = -100000000;
            infy = k*infx+m;
        }
    }
    long double maxlen = 100000000000000000000000000000000;
    long long int maxc = 0;
    for(int i =0; i<governs; i++) {
        long double len = (coords[i*2]-infx)*(coords[i*2]-infx) + (coords[i*2+1]-infy)*(coords[i
            *2+1]-infy);

        if(len==maxlen)
            maxc=-1;
        if(len<maxlen) {
            maxlen = len;
            maxc = i+1;
        }
    }
    cout<<maxc;
    return 0;

}
```

Task F (—)