# Олимпиада СПбГУ по информатике 2018/19 учебного года

Салькаев Руслан Ильдарович

| A | B | C | D | E | F | Sum |
|---|---|---|---|---|---|-----|
| 100 | 100 | 100 | 60 | 44 | 0 | 404 |

## Task A (100)

```cpp
//#include "stdafx.h"
#include <iostream>
#include <vector>
#include <algorithm>
#include <map>
#include <cmath>
using namespace std;
#define ll long long
#define fi first
#define se second
#define pb push_back
#define all(v) v.begin(),v.end()
#define fin(i,n) for(int i=0;i<n;i++)
int main()
{
        ios::sync_with_stdio(); cin.tie(0); cout.tie(0);
        int n, m;
        cin >> n >> m;
        while (n < m)
                n *= 2;
        if (n == m)
                cout << "Yes";
        else
                cout << "No";
        //system("pause");
        return 0;
}
```

## Task B (100)

```cpp
//#include "stdafx.h"
#include <iostream>
#include <vector>
#include <algorithm>
#include <map>
#include <cmath>
#include <string>
using namespace std;
#define ll long long
#define fi first
#define se second
#define pb push_back
#define all(v) v.begin(),v.end()
#define fin(i,n) for(int i=0;i<n;i++)
int main()
{
        ios::sync_with_stdio(); cin.tie(0); cout.tie(0);
        string s;
        int n;
        cin >> n;
        cin >> s;
        for (int i = 0; i < n - 1; i++){
                if (s[i] == 'o'&&s[i + 1] == 'r'){
                        cout << "Yes";
                        exit(0);
                }
                if (s[i] == 'r'&&s[i + 1] == 'o'){
                        cout << "Yes";
                        exit(0);
                }
                if (i<n-2&&s[i] == 'o'&&s[i + 2] == 'r'){
                        cout << "Yes";
                        exit(0);
                }
        }
        cout << "No";
        return 0;
}
```

## Task C (100)

```cpp
//#include "stdafx.h"
#include <iostream>
#include <vector>
#include <algorithm>
using namespace std;
#define ll long long
#define fi first
#define se second
#define pb push_back
#define all(v) v.begin(),v.end()
#define fin(i,n) for(int i=0;i<n;i++)
bool used[100002];
bool used1[100002];
int n;
int a[100002];
int sums[100002];
int m[100002];
vector<vector<int>>arr;
int dfs(int v){
        used[v] = true;
        int sum = 0;
        m[v] = 0;
        for (int i = 0; i < arr[v].size(); i++){
                if (used[arr[v][i]] == false){
                        int x = dfs(arr[v][i]);
                        sum += x;
                        m[v] = max(x, m[v]);
                }
        }
        sums[v] = sum;
        return sum + 1;
}
void dfs1(int v, int x){
        used1[v] = true;
        a[v] = max(x, m[v]) + 1;
        for (int i = 0; i < arr[v].size(); i++){
                if (used1[arr[v][i]] == false){
                        dfs1(arr[v][i], x + sums[v] - sums[arr[v][i]]);
                }
        }
}
int main()
{
        ios::sync_with_stdio(); cin.tie(0); cout.tie(0);
        cin >> n;
        arr.resize(n);
        bool k = true;
        fin(i, n - 1){
                int a, b;
                cin >> a >> b;
                if (b - a != 1)
                        k = false;
                arr[a - 1].pb(b - 1);
                arr[b - 1].pb(a - 1);
        }
        if (k){
                fin(i, n/2)
                        cout << n-i<<" ";
                for (int i = n / 2 ; i < n;i++)
                        cout << i+1 << " ";
                exit(0);
        }
        int x = dfs(0);
        dfs1(0, 0);
        fin(i, n)
                cout << a[i] << " ";
        //system("pause");
        return 0;
```

}

**Task D (60)**

```cpp
//#include "stdafx.h"
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
using namespace std;
#define ll long long
#define fi first
#define se second
#define pb push_back
#define all(v) v.begin(),v.end()
#define fin(i,n) for(int i=0;i<n;i++)

int main()
{
        ios::sync_with_stdio(); cin.tie(0); cout.tie(0);
        int n, p,t;
        string q,s;
        cin >> q;
        cin >> t >> n >> p;
        if (q == "split"){
                fin(i, t){
                        cin >> s;
                        if (n == 3){
                                cout << 'a' << s.substr(0, 6)<<"⌣";
                                cout << 'b' << s.substr(3, 6) << "⌣";
                                cout << 'c' << s.substr(0, 3) << s.substr(6, 3) << '\n';
                        }
                        if (n == 5){
                                cout << 'a' << s.substr(0, 6) << "⌣";
                                cout << 'a' << s.substr(0, 6) << "⌣";
                                cout << 'b' << s.substr(3, 6) << "⌣";
                                cout << 'b' << s.substr(3, 6) << "⌣";
                                cout << 'c' << s.substr(0, 3) << s.substr(6, 3) << '\n';
                        }
                }
        }
        else{
                fin(i, t){
                        if (n == 3){
                                string s1, s2;
                                cin >> s1 >> s2;
                                if (s1[0] == 'a'&&s2[0] == 'b'){
                                        cout << s1.substr(1,6) << s2[4]<<s2[5] << s2[6]<<'\n';
                                }
                                if (s1[0] == 'b'&&s2[0] == 'a'){
                                        swap(s1, s2);
                                        cout << s1.substr(1,6) << s2[4] << s2[5] << s2[6] << '\n';
                                }
                                if (s1[0] == 'a'&&s2[0] == 'c'){
                                        cout << s1.substr(1,6) << s2[4] << s2[5] << s2[6] << '\n';
                                }
                                if (s1[0] == 'c'&&s2[0] == 'a'){
                                        swap(s1, s2);
                                        cout << s1.substr(1,6) << s2[4] << s2[5] << s2[6] << '\n';
                                }
                                if (s1[0] == 'c'&&s2[0] == 'b'){
                                        cout << s1[1]<<s1[2] <<s1[3]<< s2.substr(1,6)<< '\n';
                                }
                                if (s1[0] == 'b'&&s2[0] == 'c'){
                                        swap(s1, s2);
                                        cout << s1[1] << s1[2] <<s1[3]<< s2.substr(1,6) << '\n';
                                }
                        }
                        if (n == 5){
                                string s1, s2,s3;
                                cin >> s1 >> s2 >> s3;
                                string res = "aaaaaaaaa";
```

```cpp
                                        if (s1[0] == 'a'){
                                                fin(j, 6)
                                                        res[j] = s1[j + 1];
                                        }
                                        if (s1[0] == 'b'){
                                                fin(j, 6)
                                                        res[j+3] = s1[j + 1];
                                        }
                                        if (s1[0] == 'c'){
                                                fin(j, 3)
                                                        res[j] = s1[j + 1];
                                                fin(j, 3)
                                                        res[j+6] = s1[j + 4];
                                        }
                                        swap(s1, s2);
                                        if (s1[0] == 'a'){
                                                fin(j, 6)
                                                        res[j] = s1[j + 1];
                                        }
                                        if (s1[0] == 'b'){
                                                fin(j, 6)
                                                        res[j + 3] = s1[j + 1];
                                        }
                                        if (s1[0] == 'c'){
                                                fin(j, 3)
                                                        res[j] = s1[j + 1];
                                                fin(j, 3)
                                                        res[j + 6] = s1[j + 4];
                                        }
                                        swap(s1, s3);
                                        if (s1[0] == 'a'){
                                                fin(j, 6)
                                                        res[j] = s1[j + 1];
                                        }
                                        if (s1[0] == 'b'){
                                                fin(j, 6)
                                                        res[j + 3] = s1[j + 1];
                                        }
                                        if (s1[0] == 'c'){
                                                fin(j, 3)
                                                        res[j] = s1[j + 1];
                                                fin(j, 3)
                                                        res[j + 6] = s1[j + 4];
                                        }
                                        cout << res << '\n';
                                }
                        }
                }
                //system("pause");
                return 0;
        }
```

```cpp
//#include "stdafx.h"
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <cmath>
using namespace std;
#define ll long long
#define fi first
#define se second
#define double long double
#define pb push_back
#define all(v) v.begin(),v.end()
#define fin(i,n) for(int i=0;i<n;i++)
double dist(double x1, double y1, double x2, double y2){
        return (x1 - x2)*(x1 - x2) + (y1 - y2)*(y1 - y2);
}
int main()
{
        ios::sync_with_stdio(); cin.tie(0); cout.tie(0);
        int n;
        double x1, y1, x2, y2, xp, yp, xq, yq;
        cin >> n;
        vector<pair<pair<int, int>, int>>arr(n);
        fin(i, n){
                cin >> arr[i].first.fi >> arr[i].fi.second;
                arr[i].second = i;
        }
        cin >> xp >> yp >> xq >> yq;
        if (yp == yq){
                sort(all(arr));
                if (xq > xp)
                        reverse(all(arr));
                double m = arr[0].first.first;
                double y = abs(arr[0].first.second - yp);
                int i = 0;
                int a = arr[0].se;
                int k = 1;
                while (i<n&&arr[i].fi.first == m){
                        if (y > abs(arr[i].first.se - yp)){
                                y = abs(arr[i].fi.se - yp);
                                a = arr[i].second;
                                k = 1;
                        }
                        else
                                if (i>0 && y == abs(arr[i].first.se - yp) && arr[i].first.first ==
                                    m)
                                        k++;
                        i++;
                }
                if (k > 1){
                        cout << -1;
                        exit(0);
                }
                cout << a + 1;
                exit(0);
        }
        if (xp == xq){
                exit(0);
                sort(all(arr));
                if (yq > yp)
                        reverse(all(arr));
                double m = arr[0].first.se;
                double y = abs(arr[0].first.fi - xp);
                int i = 0;
                int a = arr[0].se;
                int k = 1;
                while (i<n&&arr[i].fi.se == m){
```

```cpp
                    if (y > abs(arr[i].first.fi - xp)){
                            y = abs(arr[i].fi.fi - xp);
                            a = arr[i].second;
                            k = 1;
                    }
                    else
                            if (i>0 && y == abs(arr[i].first.fi - xp) && arr[i].first.se == m)
                                    k++;
                    i++;
            }
            if (k > 1){
                    cout << -1;
                    exit(0);
            }
            cout << a + 1;
            exit(0);
    }
    double a = 1;
    double b = (xq - xp) / (yp - yq);
    double c = -xp - yp*b;
    vector<pair<pair<double, double>, int>>arr1(n);
    fin(i, n){
            arr1[i].second = i;
            arr1[i].first.se = abs(a*arr[i].first.fi + b*arr[i].first.se + c) / sqrt(1 + b*b);
            double c1 = -b*arr[i].fi.fi + a*arr[i].first.second;
            double a1 = b;
            double b1 = -a;
            double xk = (c*b1 / b - c1) / (a1 - b1*a / b);
            arr1[i].first.first = xk;
    }
    sort(all(arr1));
    if (xq > xp)
            reverse(all(arr1));
    double m = arr1[0].first.first;
    double y = abs(arr1[0].first.second);
    int i = 0;
    int at = arr1[0].se;
    int k = 1;
    while (i<n&&arr1[i].fi.first == m){
            if (y > abs(arr1[i].first.se)){
                    y = abs(arr1[i].fi.se);
                    at = arr1[i].second;
                    k = 1;
            }
            else
                    if (i>0 && y == abs(arr1[i].first.se) && arr1[i].first.first == m)
                            k++;
            i++;
    }
    if (k > 1){
            cout << -1;
            exit(0);
    }
    cout << at + 1;
    //system("pause");
    return 0;
}
```

**Task F (—)**