

# Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	60	35	7	402

## Task A (100)

```
#include "bits/stdc++.h"

#pragma GCC optimize("O3")

// #define debug
#ifdef debug
#include "Debug.h"
#endif // debug

typedef long long LL;

using namespace std;

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    LL n, m;
    cin >> n >> m;
    while(n < m) {
        n*=2;
    }
    if(n == m){
        cout << "Yes" << endl;
    } else {
        cout << "No" << endl;
    }
    return 0;
}
```

## Task B (100)

```
#include "bits/stdc++.h"

#pragma GCC optimize("O3")

// #define debug
// #ifdef debug
// #include "Debug.h"
// #endif // debug

typedef long long LL;

using namespace std;

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    LL n;
    cin >> n;
    string a;
    cin >> a;
    for(int i = 0; i < n - 1; i++) {
        if((a[i] == 'o' && a[i + 1] == 'r') || (a[i] == 'r' && a[i + 1] == 'o')) {
            cout << "Yes";
            return 0;
        }
        if(i + 2 < n && (a[i] == 'o' && a[i + 2] == 'r')){
            cout << "Yes";
            return 0;
        }
    }
    cout << "No";
    return 0;
}
```

## Task C (100)

```
#include <map>
#include <vector>
#include <iostream>
#include <string>
#include <algorithm>

#pragma GCC optimise("O3")

// #define debug
#ifdef debug
#include "Debug.h"
#endif // debug

#define fi first
#define se second

typedef long long LL;

using namespace std;

int n;

map<pair<int, int>, int> ch;
vector<vector<int>> a;
vector<pair<int, int>> p;
vector<int> s;

int dfs(int v, int par){
    int res = 1;
    int ans = 0;
    for (int i = 0; i < a[v].size(); i++) {
        if (a[v][i] == par) continue;
        if (ch[{v, a[v][i]}] == -1) {
            int t = dfs(a[v][i], v);
            res += t;
            ch[{v, a[v][i]}] = t;
            ans = max(ans, t);
        } else {
            res += ch[{v, a[v][i]}];
            ans = max(ans, ch[{v, a[v][i]}]);
        }
    }
    s[v] = max(ans, n - res);
    return res;
}

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    cin >> n;
    if (n == 1) {
        cout << 1 << endl;
        return 0;
    }
    a.resize(n);
    s.resize(n);
    p.resize(n - 1);
    for (int i = 0; i < n - 1; i++) {
        cin >> p[i].fi >> p[i].se;
        p[i].fi--;
        p[i].se--;
        a[p[i].fi].push_back(p[i].se);
        ch[{p[i].fi, p[i].se}] = -1;
        a[p[i].se].push_back(p[i].fi);
        ch[{p[i].se, p[i].fi}] = -1;
    }
    dfs(0, 0);
    cout << endl;
```

```

    for (auto i : s) {
        cout << i + 1 << ' ';
    }
    cout << endl;
    return 0;
}
/*
5
1 2
2 3
2 4
1 5
*/

```

## Task D (60)

```
#include <map>
#include <vector>
#include <iostream>
#include <string>

#pragma GCC optimize("O3")

// #define debug
#ifdef debug
#include "Debug.h"
#endif // debug

#define fi first
#define se second

typedef long long LL;

using namespace std;

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    string x;
    cin >> x;
    if (x == "split") {
        int t, n, p;
        cin >> t >> n >> p;
        if (n == 3) {
            for (int i = 0; i < t; i++) {
                string s;
                cin >> s;
                string a = "a", b = "b", c = "c";
                a += s.substr(0, 3);
                a += s.substr(6, 8);
                b += s.substr(0, 6);
                c += s.substr(3, 8);
                cout << a << ' ' << b << ' ' << c << endl;
            }
        } else {
            for (int i = 0; i < t; i++) {
                string s;
                cin >> s;
                string a = "a", b = "b", c = "c";
                a += s.substr(0, 3);
                a += s.substr(6, 8);
                b += s.substr(0, 6);
                c += s.substr(3, 8);
                cout << a << ' ' << b << ' ' << c << ' ' << a << ' ' << b << endl;
            }
        }
    } else {
        int t, n, p;
        cin >> t >> n >> p;
        if (n == 3 || n == 5) {
            for (int i = 0; i < t; i++) {
                string s = ".....";
                string x;
                for (int i = 0; i < n / 2 + 1; i++) {
                    cin >> x;
                    if (x[0] == 'a') {
                        s[0] = x[1];
                        s[1] = x[2];
                        s[2] = x[3];
                        s[6] = x[4];
                        s[7] = x[5];
                        s[8] = x[6];
                    }
                    if (x[0] == 'b') {
```

```

        s[0] = x[1];
        s[1] = x[2];
        s[2] = x[3];
        s[3] = x[4];
        s[4] = x[5];
        s[5] = x[6];
    }
    if (x[0] == 'c') {
        s[3] = x[1];
        s[4] = x[2];
        s[5] = x[3];
        s[6] = x[4];
        s[7] = x[5];
        s[8] = x[6];
    }
    cout << s << endl;
}

}

}
return 0;
}
/*
merge
1 5 7
aaaaccc baaabbb baaabbb
*/

```

## Task E (35)

```
#include <map>
#include <vector>
#include <iostream>
#include <string>

#pragma GCC optimise("O3")

// #define debug
#ifdef debug
#include "Debug.h"
#endif // debug

#define fi first
#define se second

typedef long long LL;

using namespace std;

struct point{
    LL x = 0, y = 0;
    point() {}
};

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    int n;
    cin >> n;
    vector<point> a(n);
    for (int i = 0; i < n; i++) {
        cin >> a[i].x >> a[i].y;
    }
    point s, f;
    cin >> s.x >> s.y >> f.x >> f.y;
    if (s.y == f.y) {
        point p = a[0];
        int ans = 1;
        if (s.x < f.x) {
            for (int i = 1; i < n; i++) {
                if (a[i].x > p.x) {
                    p = a[i];
                    ans = i + 1;
                } else if (a[i].x == p.x && abs(a[i].y - f.y) < abs(p.y - f.y)) {
                    p = a[i];
                    ans = i + 1;
                } else if (a[i].x == p.x && abs(a[i].y - f.y) == abs(p.y - f.y)) {
                    ans = -1;
                }
            }
            cout << ans;
        } else {
            for (int i = 1; i < n; i++) {
                if (a[i].x < p.x) {
                    p = a[i];
                    ans = i + 1;
                } else if (a[i].x == p.x && abs(a[i].y - f.y) < abs(p.y - f.y)) {
                    p = a[i];
                    ans = i + 1;
                } else if (a[i].x == p.x && abs(a[i].y - f.y) == abs(p.y - f.y)) {
                    p = a[i];
                    ans = -1;
                }
            }
            cout << ans;
        }
    } else {
    }
```

```

        return 1;
    }
    //cin >> n;
    return 0;
}
/*
6
0 0
10 3
10 -1
-10 2
-11 1
-12 3
0 1
10 1
*/

```



## Task F (7)

```
#include <map>
#include <vector>
#include <iostream>
#include <string>
#include <algorithm>

#pragma GCC optimise("O3")

// #define debug
#ifdef debug
#include "Debug.h"
#endif // debug

#define fi first
#define se second

typedef long long LL;

using namespace std;

struct point{
    LL x = 0, y = 0;
    point() {}
};

LL ans = 0;
int n, k;
vector<pair<LL, LL>> a;

void f(int u, LL sc, LL r, LL b) {
    // cout << u << ' ' << sc << ' ' << r << ' ' << b << endl;
    if (u >= n) {
        ans = max(sc, ans);
        return;
    }
    f(u + 1, sc + min(r + k, a[u].fi) + min(b, a[u].se), max(r + k - a[u].fi, 0ll), max(b - a[u].se, 0ll));
    f(u + 1, sc + min(r, a[u].fi) + min(b + k, a[u].se), max(r - a[u].fi, 0ll), max(b + k - a[u].se, 0ll));
}

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    cin >> n >> k;
    a.resize(n);
    for (int i = 0; i < n; i++) {
        cin >> a[i].fi >> a[i].se;
    }
    f(0, 0, 0, 0);
    cout << ans;
    return 0;
}
```