

Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	60	12	7	379

Task A (100)

```
#include <bits/stdc++.h>
#define ll long long
#define ld long double
#define pb push_back
#define fi first
#define si second
using namespace std;
ll n, m;
int main() {
    cin >> n >> m;
    while (n < m)
    {
        n *= 2;
    }
    if (n == m) {
        cout << "Yes" << endl;
    } else cout << "No" << endl;
}
```

Task B (100)

```
#include <bits/stdc++.h>
#define ll long long
#define ld long double
#define pb push_back
#define fi first
#define si second
using namespace std;
ll n, m;
string s, s1;
int main() {
    cin >> n;
    cin >> s;
    for (ll i = 0; i < (ll)s.size() - 1; ++i) {
        if (s[i] == 'o' && s[i + 1] == 'r' || s[i] == 'r' && s[i + 1] == 'o') {
            cout << "Yes" << endl;
            return 0;
        }
    }
    for (ll i = 0; i < (ll)s.size() - 2; ++i) {
        if (s[i] == 'o' && s[i + 2] == 'r') {
            cout << "Yes" << endl;
            return 0;
        }
    }
    cout << "No" << endl;
}
```

Task C (100)

```
#include <bits/stdc++.h>
#define ll long long
#define ld long double
#define pb push_back
#define fi first
#define si second
using namespace std;
const ll maxn = 200000;
ll n, m;
vector<ll> a[maxn];
ll siz[maxn];
ll ans[maxn];
bool us[maxn];
void dfs(ll v) {
    us[v] = 1;
    ans[v] = 0;
    for (auto p : a[v]) {
        if (!us[p]) {
            dfs(p);
            siz[v] += siz[p];
            ans[v] = max(ans[v], siz[p] + 1);
        }
    }
    siz[v]++;
    ans[v] = max(ans[v], n - siz[v] + 1);
}
int main() {
    cin >> n;
    if (n == 1) {
        cout << 1 << endl;
        return 0;
    }
    for (ll i = 1; i <= n - 1; ++i) {
        ll x, y;
        cin >> x >> y;
        a[x].pb(y);
        a[y].pb(x);
    }
    ll root = 0;
    for (ll i = 1; i <= n; ++i) {
        if ((ll)a[i].size() == 1) {
            root = i;
            break;
        }
    }
    dfs(root);
    for (ll i = 1; i <= n; ++i)
        cout << ans[i] << " ";
    cout << endl;
}
```

Task D (60)

```

#include <bits/stdc++.h>
#define ll long long
#define ld long double
#define pb push_back
#define fi first
#define si second
using namespace std;
string s;
string so[10], ss, sos, ans, sos1;
ll t, n, p;
int main() {
    //freopen("input.txt", "r", stdin);
    cin >> s;
    ans.resize(9);
    if (s == "split") {
        cin >> t >> n >> p;
        //if (n == 3) {
            for (ll j = 1; j <= t; ++j) {

                cin >> ss;
                for (ll i = 0; i < ss.size() - 3; ++i)
                    cout << ss[i];
                cout << 'a' << "\n";
                if (n == 5) {
                    cout << ss[ss.size() - 2] << ss[ss.size() - 1];
                    for (ll i = 0; i < ss.size() - 2; ++i)
                        if (i % 2 == 0) {
                            cout << ss[i];
                        }
                    cout << 'b' << "\n";
                    cout << ss[ss.size() - 2] << ss[ss.size() - 1];
                    for (ll i = 0; i < ss.size() - 2; ++i)
                        if (i % 2 == 1) {
                            cout << ss[i];
                        }
                    cout << ss[ss.size() - 3];
                    cout << 'k' << "\n";
                }
                cout << ss[ss.size() - 2] << ss[ss.size() - 1];
                for (ll i = 0; i < ss.size() - 2; ++i)
                    if (i % 2 == 0) {
                        cout << ss[i];
                    }
                cout << 'b' << "\n";
                cout << ss[ss.size() - 2] << ss[ss.size() - 1];
                for (ll i = 0; i < ss.size() - 2; ++i)
                    if (i % 2 == 1) {
                        cout << ss[i];
                    }
                cout << ss[ss.size() - 3];
                cout << 'k' << endl;
            }
        // }
    } else {
        cin >> t >> n >> p;
        //cout << -1 << endl;
        // if (n == 3) {
            for (ll j = 1; j <= t; ++j) {
                cin >> ss >> sos;
                if (n == 5) {
                    cin >> sos1;
                    if (ss == sos)
                        ss = sos1;
                }
                if (ss[6] != 'a')
                    swap(ss, sos);
                if (ss[6] == 'a') {
                    for (ll i = 0; i < ss.size() - 1; ++i)
                        ans[i] = ss[i];
                }
            }
        // }
    }
}

```

```

    }
    if (ss[6] == 'k') {
        ll uk = 0;
        ans[7] = ss[uk];
        ans[6] = ss[5];
        ans[8] = ss[uk + 1];
        uk = 2;
        for (ll i = 0; i < 7; ++i)
            if (i % 2 == 1) {
                ans[i] = ss[uk];
                ++uk;
            }
    }
    if (ss[6] == 'b') {
        ll uk = 0;
        ans[7] = ss[uk];
        ans[8] = ss[uk + 1];
        uk = 2;
        for (ll i = 0; i < 7; ++i)
            if (i % 2 == 0) {
                ans[i] = ss[uk];
                ++uk;
            }
    }
    swap(ss, sos);
    // cout << ss << endl;
    if (ss[6] == 'k') {
        ll uk = 0;
        ans[7] = ss[uk];
        ans[8] = ss[uk + 1];
        uk = 2;
        ans[6] = ss[5];
        for (ll i = 0; i < 7; ++i)
            if (i % 2 == 1) {
                ans[i] = ss[uk];
                ++uk;
            }
    }
    if (ss[6] == 'b') {
        ll uk = 0;
        ans[7] = ss[uk];
        ans[8] = ss[uk + 1];
        uk = 2;

        for (ll i = 0; i < 7; ++i)
            if (i % 2 == 0) {
                ans[i] = ss[uk];
                ++uk;
            }
    }
    cout << ans << endl;
}
// }
}
}

```

Task E (12)

```

#include <bits/stdc++.h>
#define ll long long
#define ld long double
#define pb push_back
#define fi first
#define si second
using namespace std;
const ll maxn = 200000;
const ld eps = 0.0000000001;
const ld inf = 1e15;
ll n, ot, x, y;
ld ir = 1e10, ir1 = 1e10;
ld maxl = inf;
vector<pair<ld, ld>> a;
ld rast(ld x, ld y, ld v, ld v1) {
    return sqrt(abs((v - x) * (v - x) + (v1 - y) * (v1 - y)));
}

int main() {
    cin >> n;
    // cout<<fixed<<setprecision(7)<<endl;
    for (ll i = 1; i <= n; ++i) {
        cin >> x >> y;
        a.pb({x, y});
    }
    /*for (ll i = 0; i < n; ++i) {
        x = a[i].fi; y = a[i].si;
        if ((maxl - rast(x, y, ir, 0)) > eps) {
            maxl = rast(x, y, ir, 0);
            ot = i + 1;
        }
        // cout << maxl <<endl;
    }

    ll kol = 0;
    //cout << 9 <<endl;
    for (auto p : a) {
        x = p.fi; y = p.si;
        if ((maxl - rast(x, y, ir, 0)) > eps) {
            maxl = rast(x, y, ir, 0);
            //ot = i;
            // cout << maxl <<endl;
        } else {
            if(abs(maxl - rast(x, y, ir, 0)) < eps) {
                ++kol;
            }
        }
    }
    */
    ll kol = 0;
    ll xp, xq, yp, yq;
    cin >> xp >> yp >> xq >> yq;
    //cout << xp <<" "<<yp<<endl;
    /* if (xp == 0 && yp == 0 && yq == 0) {
        if (kol > 1) {
            cout << -1 <<endl;
            return 0;
        }
        cout << ot <<endl;
        return 0;
    }
    */
    maxl = inf;
    kol = 0;
    // if (xp > xq) {
    //     ir = -ir;
    // }
    if (yq != yp) {
        ir1 = (ld)(ir * (xq - xp) - yp * (xq - xp) + xp * (yq - yp)) / (ld)(yq - yp);
    } else {

```

```

        ir = 1e10;
        ir1 = yq;
        // if (xp > xq) {
        //     ir = -ir;
        // }
    }
    // cout << ir1 << "*" << endl;
    // cout << ir << endl;
    for (ll i = 0; i < n; ++i) {
        x = a[i].fi; y = a[i].si;
        if ((max1 - rast(x, y, ir, ir1)) > eps) {
            max1 = rast(x, y, ir, ir1);
            ot = i + 1;
            // cout << max1 << endl;
        }
    }

    for (auto p : a) {
        x = p.fi; y = p.si;
        if ((max1 - rast(x, y, ir, ir1)) > eps) {
            max1 = rast(x, y, ir, ir1);
            // ot = i;
            // cout << max1 << endl;
        } else {
            if (abs(max1 - rast(x, y, ir, ir1)) < eps) {
                ++kol;
            }
        }
    }
    if (kol > 1) {
        cout << -1 << endl;
        return 0;
    }
    cout << ot << endl;
    return 0;
}

```

Task F (7)

```
#include <bits/stdc++.h>
#define ll long long
#define ld long double
#define pb push_back
#define fi first
#define si second
using namespace std;
const ll e = (1 << 16);
ll n, k;
ll r[100000], b[100000];
ll ans;
ll d[10000];
ll che() {
    ll kr = 0, ci = 0, dd = 0;
    for (ll i = 0; i < n; ++i) {
        if (d[i] == 1) {
            kr+=k;
        } else ci += k;
        // cout << kr <<" "<<ci <<endl;
        dd += min(kr, r[i]) + min(ci, b[i]);
        kr -= min(kr, r[i]);
        ci -= min(ci, b[i]);
    }
    return dd;
}
int main() {
    cin >> n >> k;
    for (ll i = 0; i < n; ++i) {
        cin >> r[i] >> b[i];
    }
    for (ll i = 0; i < e; ++i) {
        for (ll j = 0; j < n; ++j) {
            if ((i>>j)& 1) {
                d[j] = 1;
            } else d[j] = 0;
        }
        ans = max(ans, che());
    }
    cout << ans <<endl;
}
```