

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)

```
#include <bits/stdc++.h>

using namespace std;

int main()
{
    int n, m;
    cin >> n >> m;
    while (n < m) {
        n *= 2;
    }
    if (n == m) {
        cout << "Yes";
        return 0;
    }
    cout << "No";
    return 0;
}
```

Task B (100)

```
#include <bits/stdc++.h>

using namespace std;

int main()
{
    int n;
    string s;
    cin >> n >> s;
    if (n == 1) {
        cout << "No";
        return 0;
    }
    for (int i = 1; i != n; i++) {
        if ((s[i] == 'r' && s[i-1] == 'o') || (s[i] == 'o' && s[i-1] == 'r') || (i > 1 && s[i] == 'r' && s[i-2] == 'o')) {
            cout << "Yes";
            return 0;
        }
    }
    cout << "No";
    return 0;
}
```

Task C (100)

```
#include <bits/stdc++.h>

using namespace std;

int n, in1, in2, cnt[100000], used[100000], top[100000], ans, k = 0, t = 0;
vector<int> g[100000];

void dfs(int x) {
    top[x] = t;
    t++;
    for (int i = 0; i != g[x].size(); i++) {
        int v = g[x][i];
        if (used[v] == 0) {
            used[v] = 1;
            dfs(v);
            cnt[x] += cnt[v];
        }
    }
}

int main()
{
    cin >> n;
    for (int i = 0; i != n-1; i++) {
        cin >> in1 >> in2;
        in1--;
        in2--;
        if (abs(in1 - in2) > 1) {
            k = 1;
        }
        g[in1].push_back(in2);
        g[in2].push_back(in1);
        cnt[i] = 1;
        used[i] = 0;
    }
    cnt[n-1] = 1;
    used[n-1] = 0;
    /* if (k == 0) {
        for (int i = 0; i != n; i++) {
            cout << max(n - i, i + 1) << " ";
        }
        return 0;
    }
    */ for (int i = 0; i != n; i++) {
        if (g[i].size() == 1) {
            used[i] = 1;
            dfs(i);
            break;
        }
    }
    for (int i = 0; i != n; i++) {
        ans = 0;
        for (int j = 0; j != g[i].size(); j++) {
            int v = g[i][j];
            // cout << top[v] << " " << top[i] << " " << cnt[v] << " " << cnt[i] << endl;
            if (top[v] < top[i]) {
                ans = max(ans, n - cnt[i]);
            }
            else {
                ans = max(ans, cnt[v]);
            }
        }
        cout << ans + 1 << endl;
    }
    return 0;
}
```

Task D (60)

```
#include <bits/stdc++.h>

using namespace std;

int main()
{
    string s, in, in1, ans = "aaaaaaaa";
    int t, n, p;
    cin >> s >> t >> n >> p;
    for (int i = 0; i != t; i++) {
        if (s[0] == 's') {
            cin >> in;
            if (n == 3) {
                cout << 'a' << in[0] << in[1] << in[2] << in[3] << in[4] << in[5] << "\n";
                cout << 'b' << in[3] << in[4] << in[5] << in[6] << in[7] << in[8] << "\n";
                cout << 'c' << in[0] << in[1] << in[2] << in[6] << in[7] << in[8] << endl;
            }
            else {
                cout << 'a' << in[0] << in[1] << in[2] << in[3] << in[4] << in[5] << "\n";
                cout << 'a' << in[0] << in[1] << in[2] << in[3] << in[4] << in[5] << "\n";
                cout << 'b' << in[3] << in[4] << in[5] << in[6] << in[7] << in[8] << "\n";
                cout << 'b' << in[3] << in[4] << in[5] << in[6] << in[7] << in[8] << "\n";
                cout << 'c' << in[0] << in[1] << in[2] << in[6] << in[7] << in[8] << endl;
            }
        }
        else {
            for (int j = 0; j != n/2 + 1; j++) {
                cin >> in1;
                if (in1[0] == 'a') {
                    ans[0] = in1[1];
                    ans[1] = in1[2];
                    ans[2] = in1[3];
                    ans[3] = in1[4];
                    ans[4] = in1[5];
                    ans[5] = in1[6];
                }
                if (in1[0] == 'b') {
                    ans[3] = in1[1];
                    ans[4] = in1[2];
                    ans[5] = in1[3];
                    ans[6] = in1[4];
                    ans[7] = in1[5];
                    ans[8] = in1[6];
                }
                if (in1[0] == 'c') {
                    ans[0] = in1[1];
                    ans[1] = in1[2];
                    ans[2] = in1[3];
                    ans[6] = in1[4];
                    ans[7] = in1[5];
                    ans[8] = in1[6];
                }
            }
            cout << ans << endl;
        }
    }
    return 0;
}
```

Task E (21)

```
#include <bits/stdc++.h>

using namespace std;

int main()
{
    long long n, xp, yp, xq, yq, xf, yf, inf = 2000000000000;
    vector<pair<long long, long long>> c;
    vector<pair<long long, long long>> ans;
    cin >> n;
    for (int i = 0; i != n; i++) {
        cin >> xp >> yp;
        c.push_back({xp, yp});
    }
    cin >> xp >> yp >> xq >> yq;
    if (n == 1) {
        cout << 1;
        return 0;
    }
    /* if (yp == 0 && yq == 0) {
        if (xp < xq) {
            long long m1 = -1*inf, m2 = -1*inf, mli, m2i;
            for (int i = 0; i != n; i++) {
                if (c[i].first - abs(c[i].second) > m1) {
                    m2 = m1;
                    m1 = c[i].first;
                    m2i = mli;
                    mli = i;
                }
                else if (c[i].first - abs(c[i].second) > m2) {
                    m2 = c[i].first;
                    m2i = i;
                }
            }
            if (m1 == m2) {
                cout << -1;
                return 0;
            }
            cout << mli + 1;
        }
        else {
            long long m1 = inf, m2 = inf, mli, m2i;
            for (int i = 0; i != n; i++) {
                if (c[i].first + abs(c[i].second) < m1) {
                    m2 = m1;
                    m1 = c[i].first;
                    m2i = mli;
                    mli = i;
                }
                else if (c[i].first + abs(c[i].second) < m2) {
                    m2 = c[i].first;
                    m2i = i;
                }
            }
            if (m1 == m2) {
                cout << -1;
                return 0;
            }
            cout << mli + 1;
        }
    }
    return 0;
}
*/ xf = xq-xp;
yf = yq-yp;
while (abs(xf) < inf && abs(yf) < inf) {
    xf *= 2;
    yf *= 2;
}
xf += xq;
```

```

yf += yq;
for (int i = 0; i != n; i++) {
    ans.push_back({((xf - c[i].first)*(xf - c[i].first) + (yf - c[i].second)*(yf - c[i].second)), i+1});
}
sort(ans.begin(), ans.end());
if (ans[0].first == ans[1].first) {
    cout << -1;
    return 0;
}
cout << ans[0].second;
return 0;
}

```

Task F (0)

```
#include <bits/stdc++.h>

using namespace std;

long long n, k, in1, in2, ans = 0, null = 0;
vector<pair<long long, long long>> a;

void rec(long long red, long long blue, long long sum, int i) {
    if (i < n) {
        rec(max(null, red+k-a[i].first), blue, sum + min(k+red, a[i].first), i+1);
        rec(red, max(null, blue+k-a[i].second), sum + min(k+blue, a[i].second), i+1);
    }
    else {
        ans = max(ans, sum);
    }
}

int main()
{
    cin >> n >> k;
    for (int i = 0; i != n; i++) {
        cin >> in1 >> in2;
        a.push_back({in1, in2});
    }
    rec(0, 0, 0, 0);
    cout << ans;
    return 0;
}
```