

# Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	60	21	7	388

## Task A (100)

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

using namespace std;

int main()
{
    ios_base::sync_with_stdio(false);

    int a, b;
    cin >> a >> b;
    while (a<b) a*=2;
    if (a == b) cout << "Yes";
    else cout << "No";
}
```

## Task B (100)

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

using namespace std;

int main()
{
    ios_base::sync_with_stdio(false);

    int n;
    cin >> n;
    string s;
    cin >> s;

    s+="##";
    for (int i=0; i < s.size()-2; i++)
    {
        if (s[i] == 'o')
        {
            if (s[i+1] == 'r' || s[i+2] == 'r')
            {
                cout << "Yes";
                return 0;
            }
        }
        if (s[i] == 'r' && s[i+1] == 'o')
        {
            cout << "Yes";
            return 0;
        }
    }
    cout << "No";
}
```

## Task C (100)

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

using namespace std;

int n, ans[100001];
vector <int> gr[100001];

int work(int v, int p)
{
    int r=0;
    for (int x:gr[v])
    {
        int u = 0;
        if (x!=p) u=work(x, v);
        r+=u;
        ans[v] = max(ans[v], u+1);
    }
    ans[v] = max(ans[v], n-r);
    return r+1;
}

int main()
{
    ios_base::sync_with_stdio(false);

    cin >> n;
    for (int i=1; i < n; i++)
    {
        int a, b;
        cin >> a >> b;
        gr[a].push_back(b);
        gr[b].push_back(a);
    }
    work(1, 0);
    for (int i=1; i <= n; i++) cout << ans[i] << '␣';
}
```

## Task D (60)

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

using namespace std;

int main()
{
    ios_base::sync_with_stdio(false);

    //freopen("text.txt", "w", stdout);
    string s;
    int t, n, p;
    cin >> s >> t >> n >> p;
    if (s == "split")
    {
        while (t--)
        {
            string q;
            cin >> q;
            if (n == 3)
            {
                cout << "a";
                for (int i=0; i < 6; i++) cout << q[i];
                cout << "_b";
                for (int i=0; i < 3; i++) cout << q[i];
                for (int i=6; i < 9; i++) cout << q[i];
                cout << "_c";
                for (int i=3; i < 9; i++) cout << q[i];
                cout << endl;
            }
            else if (n == 5)
            {
                cout << "a";
                for (int i=0; i < 6; i++) cout << q[i];
                cout << "_a";
                for (int i=0; i < 6; i++) cout << q[i];
                cout << "_b";
                for (int i=0; i < 3; i++) cout << q[i];
                for (int i=6; i < 9; i++) cout << q[i];
                cout << "_b";
                for (int i=0; i < 3; i++) cout << q[i];
                for (int i=6; i < 9; i++) cout << q[i];
                cout << "_c";
                for (int i=3; i < 9; i++) cout << q[i];
                cout << endl;
            }
        }
    }
    else
    {
        while (t--)
        {
            if (n == 3)
            {
                string q[2];
                for (int i=0; i < 2; i++) cin >> q[i];
                sort(q, q+2);
                if (q[0][0] == 'a')
                {
                    for (int i=1; i < 7; i++) cout << q[0][i];
                    for (int i=4; i < 7; i++) cout << q[1][i];
                }
                else
                {
                    for (int i=1; i < 4; i++) cout << q[0][i];
                    for (int i=1; i < 7; i++) cout << q[1][i];
                }
            }
            else if (n == 5)
```

```

    {
        string q[3];
        for (int i=0; i < 3; i++) cin >> q[i];
        sort(q, q+3);
        if (q[0][0] == 'a')
        {
            for (int i=1; i < 7; i++) cout << q[0][i];
            for (int i=4; i < 7; i++) cout << q[2][i];
        }
        else
        {
            for (int i=1; i < 4; i++) cout << q[0][i];
            for (int i=1; i < 7; i++) cout << q[2][i];
        }
    }
    cout << endl;
}
}
}

```

## Task E (21)

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

using namespace std;

int main()
{
    ios_base::sync_with_stdio(false);

    pair<double, double> p[100001];
    double x1, y1, x2, y2, cx, cy;
    //cout << (long long)x1;
    int n;
    cin >> n;
    for (int i=0; i < n; i++)
    {
        cin >> p[i].first >> p[i].second;
    }
    cin >> x1 >> y1 >> x2 >> y2;
    if (x1 == x2)
    {
        cx = x1;
        if (y1 < y2) cy = 1e5+1;
        else cy = -1e5-1;
    }
    else if (y1 == y2)
    {
        cy = y1;
        if (x1 < x2) cx = 1e5+1;
        else cx = -1e5-1;
    }
    else
    {
        double k = (y2-y1)/(x2-x1);
        double b = y1 - k*x1;
        double l, r, e=1e-6;
        if (x1 < x2)
        {
            l=x2;
            r=1e5+1;
            while (r-l>e)
            {
                double mid = (r+l)/2;
                if (abs(k*mid+b) <= 1e5+1) l = mid;
                else r=mid;
            }
            cx=l;
            cy=k*l+b;
        }
        else
        {
            l=-1e5-1;
            r=x2;
            while (r-l>e)
            {
                double mid = (r+l)/2;
                if (abs(k*mid+b) <= 1e5+1) r = mid;
                else l=mid;
            }
            cx=r;
            cy=k*r+b;
        }
    }
    //cout << setprecision(10) << fixed;
    //cout << (long long)cx << " xuy " << (long long)cy << endl;
    long double mn=1e16+4, c=-1, e=0.000001;
    //cout << (long long)mn << endl;
    for (int i=0; i < n; i++)
    {
```

```

    long double dx=p[i].first-cx, dy=p[i].second-cy;
    long double dis= sqrt(dx*dx + dy*dy);
    //cout << dx << ' ' << dy << ' ' << dis << endl;
    if (abs(dis - mn) <= e) c = -1;
    else if (dis < mn)
    {
        c = i+1;
        mn = dis;
    }
    cout << c;
}
/*
2
0 1
0 -1
0 0
0 1
*/

```

## Task F (7)

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

using namespace std;

#define ll long long

ll n, k;
ll a[100], b[100];
vector <pair <ll, pair<ll, ll> > > re[31];

ll work(ll l, ll r, ll p)
{
    if (p == 0) return 0;
    ll ret=0;
    for (auto x:re[p])
    {
        if (x.second.first >= l && x.second.second >= r) ret = max(ret, x.first);
    }
    if (ret) return ret;
    ret = min(l, a[n-p+1]) + min(r, b[n-p+1]);
    l-=min(l, a[n-p+1]);
    r-=min(r, b[n-p+1]);
    //cout << l << ' ' << r << endl;
    ret+=max(work(l+k, r, p-1), work(l, r+k, p-1));
    re[p].push_back({ret, {l, r}});
    return ret;
}

int main()
{
    ios_base::sync_with_stdio(false);

    cin >> n >> k;
    for (int i=1; i <= n; i++) cin >> a[i] >> b[i];
    cout << max(work(k,0,n), work(0,k,n));
}
```