

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>
#define ll long long
#define endl '\n'
using namespace std;

ll n, m, k;

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

Task B (100)

```
#include <bits/stdc++.h>
#define ll long long
#define endl '\n'
using namespace std;

ll n;
string s;
bool checkif(char a, char b)
{
    return ((a == 'o') && (b == 'r'));
}
void konec()
{
    cout << "Yes";
    exit(0);
}

int main()
{
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    cin >> n;
    cin >> s;
    if (n == 1)
    {
        cout << "No";
        return 0;
    }
    for (int i = 0; i < n - 1; i++)
        if (checkif(s[i], s[i + 1]))
            konec();
    for (int i = 1; i < n; i++)
    {
        swap(s[i], s[i - 1]);
        if (i >= 2)
            if (checkif(s[i - 2], s[i - 1]))
                konec();
        if (checkif(s[i - 1], s[i]))
            konec();
        if (n - i >= 2)
            if (checkif(s[i], s[i + 1]))
                konec();
        swap(s[i], s[i - 1]);
    }
    cout << "No";
    return 0;
}
```

Task C (100)

```
#include <bits/stdc++.h>
#define ll long long
#define endl '\n'
using namespace std;

typedef pair<ll, ll> para;
ll n, x, y, mux;
vector<para> edges[100005];
ll zapoln(ll tec, ll predok)
{
    ll predind, sum = 0;
    if (edges[tec].size() == 1 && predok != -1)
    {
        edges[tec][0].second = n - 1;
        return 1;
    }
    for (int i = 0; i < edges[tec].size(); i++)
        if (edges[tec][i].first != predok)
        {
            edges[tec][i].second = zapoln(edges[tec][i].first, tec);
            sum += edges[tec][i].second;
        }
    else
        predind = i;
    if (predok != -1)
        edges[tec][predind].second = n - sum - 1;
    //cout << tec << " " << sum + 1 << endl;
    return (sum + 1);
}

int main()
{
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    cin >> n;
    for (int i = 1; i < n; i++)
    {
        cin >> x >> y;
        edges[x].push_back(make_pair(y, 0));
        edges[y].push_back(make_pair(x, 0));
    }
    x = zapoln(1, -1);
    //cout << x;
    for (int i = 1; i <= n; i++)
    {
        mux = 0;
        for (int j = 0; j < edges[i].size(); j++)
            mux = max(mux, edges[i][j].second);
        cout << mux + 1 << " ";
    }
    return 0;
}
```

Task D (60)

```
#include <bits/stdc++.h>
#define ll long long
#define endl '\n'
using namespace std;

string nach, s, tov, s1, mas[1000];
ll t, n, p;

int main()
{
    //ios_base::sync_with_stdio(0);
    //cin.tie(0);
    //cout.tie(0);
    cin >> nach;
    cin >> t >> n >> p;
    if (nach == "split")
    {
        if ((n == 3) && (p == 7))
        {
            for (int j = 1; j <= t; j++)
            {
                cin >> s;
                tov = "";
                for (int i = 0; i < 6; i++)
                    tov += s[i];
                tov += 'a';
                cout << tov << "\u";
                tov = "";
                for (int i = 3; i < 9; i++)
                    tov += s[i];
                tov += 'c';
                cout << tov << "\u";
                tov = "";
                for (int i = 0; i < 3; i++)
                    tov += s[i];
                for (int i = 6; i < 9; i++)
                    tov += s[i];
                tov += 'b';
                cout << tov << "\u";
                cout << endl;
            }
        }

        if (n == 5 && p == 7)
        {
            for (int j = 1; j <= t; j++)
            {
                cin >> s;
                tov = "";
                for (int i = 0; i < 6; i++)
                    tov += s[i];
                tov += 'a';
                cout << tov << "\u";

                tov = "";
                for (int i = 3; i < 9; i++)
                    tov += s[i];
                tov += 'b';
                cout << tov << "\u";

                tov = "";
                for (int i = 0; i < 4; i++)
                    tov += s[i];
                for (int i = 7; i < 9; i++)
                    tov += s[i];
                tov += 'c';
                cout << tov << "\u";

                tov = "";
            }
        }
    }
}
```

```

        for (int i = 0; i < 2; i++)
            tov += s[i];
        for (int i = 4; i < 7; i++)
            tov += s[i];
        tov += s[8];
        tov += 'd';
        cout << tov << "\u";

        tov = "";
        for (int i = 2; i < 8; i++)
            tov += s[i];
        tov += 'e';
        cout << tov << "\u";
        cout << endl;
    }
}
}
if (nach == "merge")
{
    if ((n == 3) && (p == 7))
    {
        for (int j = 1; j <= t; j++)
        {
            cin >> s >> s1;
            if (s[6] == 'a')
            {
                for (int i = 0; i < 6; i++)
                    cout << s[i];
                for (int i = 3; i < 6; i++)
                    cout << s1[i];
                cout << endl;
            }
            if (s[6] == 'b' && s1[6] == 'a')
            {
                for (int i = 0; i < 6; i++)
                    cout << s1[i];
                for (int i = 3; i < 6; i++)
                    cout << s[i];
                cout << endl;
            }
            if (s[6] == 'b' && s1[6] == 'c')
            {
                for (int i = 0; i < 3; i++)
                    cout << s[i];
                for (int i = 0; i < 6; i++)
                    cout << s1[i];
                cout << endl;
            }
            if (s[6] == 'c')
            {
                for (int i = 0; i < 3; i++)
                    cout << s1[i];
                for (int i = 0; i < 6; i++)
                    cout << s[i];
                cout << endl;
            }
        }
    }
}

if (n == 5 && p == 7)
{
    for (int o = 1; o <= t; o++)
    {
        for (char c = 'a'; c <= 'e'; c++)
            mas[c] = "none";
        for (int i = 1; i <= 3; i++)
        {
            cin >> s;
            mas[s[6]] = s;
        }
        if ((mas['a'] != "none") && (mas['b'] != "none"))
        {
            for (int i = 0; i < 6; i++)
                cout << mas['a'][i];
        }
    }
}

```

```

        for (int i = 3; i < 6; i++)
            cout << mas[ 'b' ][ i ];
        cout << endl;
        continue;
    }

    if ((mas[ 'b' ] != "none") && (mas[ 'c' ] != "none"))
    {
        for (int i = 0; i < 3; i++)
            cout << mas[ 'c' ][ i ];
        for (int i = 0; i < 6; i++)
            cout << mas[ 'b' ][ i ];
        cout << endl;
        continue;
    }

    if ((mas[ 'e' ] != "none") && (mas[ 'c' ] != "none"))
    {
        for (int i = 0; i < 2; i++)
            cout << mas[ 'c' ][ i ];
        for (int i = 0; i < 6; i++)
            cout << mas[ 'e' ][ i ];
        cout << mas[ 'c' ][ 5 ];
        cout << endl;
        continue;
    }

    if ((mas[ 'b' ] != "none") && (mas[ 'd' ] != "none") && (mas[ 'e' ] != "none"))
    {
        for (int i = 0; i < 2; i++)
            cout << mas[ 'd' ][ i ];
        cout << mas[ 'e' ][ 0 ];
        for (int i = 0; i < 6; i++)
            cout << mas[ 'b' ][ i ];
        cout << endl;
        continue;
    }

    if ((mas[ 'a' ] != "none") && (mas[ 'c' ] != "none") && (mas[ 'd' ] != "none"))
    {
        for (int i = 0; i < 6; i++)
            cout << mas[ 'a' ][ i ];
        cout << mas[ 'd' ][ 4 ];
        for (int i = 4; i < 6; i++)
            cout << mas[ 'c' ][ i ];
        cout << endl;
        continue;
    }

    if ((mas[ 'a' ] != "none") && (mas[ 'd' ] != "none") && (mas[ 'e' ] != "none"))
    {
        for (int i = 0; i < 6; i++)
            cout << mas[ 'a' ][ i ];
        for (int i = 4; i < 6; i++)
            cout << mas[ 'e' ][ i ];
        cout << mas[ 'd' ][ 5 ];
        cout << endl;
        continue;
    }
    }
}
return 0;
}

```

Task E (21)

```
#include <bits/stdc++.h>
#define ll long long
#define endl '\n'
using namespace std;

const double eps = 0;
ll n, xp, yp, xq, yq, x, y, ans;
long double xt, yt, mun = 1000000000000000000.0, rasst;
struct para
{
    ll x, y, num;
};
para a[100];
bool fcmp(para a, para b)
{
    return (a.x <= b.x);
}
long double len(long double xa, long double ya, long double xb, long double yb)
{
    return sqrt((xa - xb) * (xa - xb) + (ya - yb) * (ya - yb));
}

int main()
{
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    cin >> n;
    for (int i = 1; i <= n; i++)
    {
        cin >> x >> y;
        a[i].x = x;
        a[i].y = y;
        a[i].num = i;
    }
    cin >> xp >> yp;
    cin >> xq >> yq;
    if (xq == xp)
    {
        xt = xq * 1.0;
        yt = 10000000000.0;
        if (yp > yq)
            yt *= -1;
    }
    else
    {
        xt = 10000000000.0;
        if (xq < xp)
            xt *= -1;
        yt = 0.0;
        yt += xt * 1.0 / (xq - xp);
        yt *= (yq - yp);
        yt -= (xp * 1.0 / (xq - xp)) * (yq - yp);
        yt += yp;
        //yt = 1.0 * (xt * (yq - yp) - xp * (yq - yp) + yp * (xq - xp)) / (1.0 * (xq - xp));
    }
    for (int i = 1; i <= n; i++)
    {
        rasst = len(xt, yt, a[i].x * 1.0, a[i].y * 1.0);
        if (abs(rasst - mun) <= eps)
            ans = -1;
        else
            if ((mun - rasst) > eps)
            {
                mun = rasst;
                ans = a[i].num;
            }
    }
    cout << ans;
```

```
}    return 0;
```


Task F (7)

```
#include <bits/stdc++.h>
#define ll long long
#define endl '\n'
using namespace std;

ll n, k, mux = 0;
typedef pair<ll, ll> para;
para a[100005];
void rec(ll teckr, ll tecsi, ll uc, ll sum)
{
    if (uc > n)
    {
        mux = max(mux, sum);
        return;
    }
    if (tecsi > a[uc].second)
    {
        sum += a[uc].second;
        tecsi -= a[uc].second;
    }
    else
    {
        sum += tecsi;
        tecsi = 0;
    }
    if (teckr > a[uc].first)
    {
        sum += a[uc].first;
        teckr -= a[uc].first;
    }
    else
    {
        sum += teckr;
        teckr = 0;
    }
    rec(teckr + k, tecsi, uc + 1, sum);
    rec(teckr, tecsi + k, uc + 1, sum);
}

int main()
{
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    cin >> n >> k;
    for (int i = 1; i <= n; i++)
        cin >> a[i].first >> a[i].second;
    rec(0, k, 1, 0);
    rec(k, 0, 1, 0);
    cout << mux;
    return 0;
}
```