Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	0	35	24	359

Task A (100)

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

using namespace std;

#define all(x) x.begin(), x.end()
#define len(x) int(x.size())

typedef long long ll;

//mt19937 rnd(228);

int main(){
        #ifdef HOME
        freopen("input.txt", "rt", stdin);
        #endif //HOME
        ios_base::sync_with_stdio(0);
        cin.tie(0);
        cout.tie(0);
        int n, m;
        cin >> n >> m;
        if (n > m){
                cout << "No";
                return 0;
        }
        int cur = n;
        for (int i = 0; i < 32; i++){
                if (cur == m){
                        cout << "Yes";
                        return 0;
                }
                cur = cur * 2;
        }
        cout << "No";
        return 0;
}
```

Task B (100)

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

using namespace std;

#define all(x) x.begin(), x.end()
#define len(x) int(x.size())

typedef long long ll;

bool check(string &s){
    int n = len(s);
    for (int i = 0; i < n - 1; i++){
        if (s[i] == 'o' && s[i + 1] == 'r') return true;
    }
    return false;
}

int main(){
    #ifdef HOME
    freopen("input.txt", "rt", stdin);
    #endif // HOME
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    int n;
    cin >> n;
    string s;
    cin >> s;
    if (check(s)){
        cout << "Yes";
        return 0;
    }
    for (int i = 0; i < n - 2; i++){
        if (s[i] == 'o' && s[i + 2] =='r'){
            cout << "Yes";
            return 0;
        }
    }
    for (int i = 0; i < n - 1; i++){
        if (s[i] == 'r' && s[i + 1] == 'o'){
            cout << "Yes";
            return 0;
        }
    }
    cout << "No";
    return 0;
}
```

Task C (100)

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

using namespace std;

#define all(x) x.begin(), x.end()
#define len(x) int(x.size())

typedef long long ll;

#define _FORTIFY_SOURCE 0
#pragma GCC optimize("Ofast")
#pragma GCC optimize("no-stack-protector")
#pragma GCC optimize("unroll-loops")
#pragma GCC target("sse,sse2,sse3,ssse3,popcnt,abm,mmx,tune=native")
#pragma GCC optimize("fast-math")

const int N = 1e5 + 10;

vector <int> g[N];
vector <int> d;
vector <int> sz;
int ans[N];

void dfs(int v, int depth, int p){
    d[v] = depth;
    for (int i : g[v])
        if (d[i] == -1)
            dfs(i, depth + 1, v);
    sz[v]++;
    for (int i : g[v])
        sz[v] += sz[i];
    int mx = len(d) - sz[v];
    for (int i : g[v])
        if (i != p)
            mx = max(sz[i], mx);
    ans[v] = mx + 1;
}

int main(){
        #ifdef HOME
        freopen("input.txt", "rt", stdin);
        #endif //HOME
        ios_base::sync_with_stdio(0);
        cin.tie(0);
        cout.tie(0);
        int n;
        cin >> n;
        bool ok = true;
        for (int i = 0; i < n - 1; i++){
                int a, b;
                cin >> a >> b;
                a--;
                b--;
                if (fabs(b - a) != 1) ok = false;
                g[a].push_back(b);
                g[b].push_back(a);
        }
        if (ok){
        int x = 0, y = n - 1;
        for (int i = 0; i < n; i++){
            int res = max(x, y) + 1;
            cout << res << '_';
            x++;
            y--;
        }
        return 0;
        }
        d.resize(n, -1);
    sz.resize(n, 0);
```

```cpp
        dfs(0, 0, -1);
        for (int i = 0; i < n; i++)
        cout << ans[i] << '␣';
        return 0;
}
```

Task D (0)

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

using namespace std;

#define all(x) x.begin(), x.end()
#define len(x) int(x.size())

typedef long long ll;

bool check(string a, string b){
    int n = len(a);
    int id1 = n - 1;
    int id2 = 0;
    int k = 0;
    while(k < 5){
        if (a[id1] == b[id2]){
            k++;
            id1--;
            id2++;
        }
        else break;
        if (id1 < 0) break;
        if (id2 >= n) break;
    }
    if (k >= 5) return true;
    else return false;
}

bool find(string a, string b){
    int n = len(a);
    int m = len(b);
    unordered_map <string, bool> was;
    for (int i = 0; i < n - m + 1; i++){
        string tmp = a.substr(i, m);
        was[tmp] = true;
    }
    return was[b];
}

int main(){
        #ifdef HOME
        freopen("input.txt", "rt", stdin);
        #endif //HOME
        ios_base::sync_with_stdio(0);
        cin.tie(0);
        cout.tie(0);
        srand(time(nullptr));
    string s;
    int t, n, p;
    cin >> s >> t >> n >> p;
    if (s == "split"){
        for (int tt = 0; tt < t; tt++){
            string tmp;
            cin >> tmp;
            string a, b, c;
            a = tmp.substr(0, 7);
            b = tmp.substr(2, 7);
            c = tmp.substr(0, 2) + tmp.substr(7, 2) + "zgq";
            cout << a << '_'<< b << '_' << c << "\n";
        }
    }
    else{
        for (int tt = 0; tt < t; tt++){
            string a, b;
            cin >> a >> b;
            string ca, cb;
            for (int j = 2; j < len(a); j++)
                ca = ca + a[j];
            for (int j = 0; j <= 4; j++)
```

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                cb = cb + b[j];
            if (ca == cb){
                cout << a << b[5] << b[6] << "\n";
                continue;
            }
            swap(a, b);
            ca = "";
            cb = "";
            for (int j = 2; j < len(a); j++)
                ca = ca + a[j];
            for (int j = 0; j <= 4; j++)
                cb = cb + b[j];
            if (ca == cb){
                cout << a << b[5] << b[6] << "\n";
            }
            else{
                string x;
                string y;
                if (find(a, "zgq"))
                    x = a;
                else
                if (find(b, "zgq"))
                    x = b;
                if (x == a) y = b;
                else y = a;
                if (x[0] == y[0] && x[1] == y[1] && x[0] != y[2] && x[1] != y[3])
                    cout << y << x[2] << x[3];
                else
                    cout << y << x[0] << x[1];
                cout << "\n";
            }
        }
    }
        return 0;
}
```

Task E (35)

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

using namespace std;

#define all(x) x.begin(), x.end()
#define len(x) int(x.size())

typedef long long ll;

struct pt{
    ll x, y, id;
    pt(){}
    pt(int a, int b){
        x = a;
        y = b;
    }
    ll dist(){
        return fabs(y);
    }
};

bool cmp(pt a, pt b){
    if (a.x == b.x)
        return (a.dist() <= b.dist());
    else
        return (a.x > b.x);
}

vector <pt> a;

int main(){
        #ifdef HOME
        freopen("input.txt", "rt", stdin);
        #endif //HOME
        ios_base::sync_with_stdio(0);
        cin.tie(0);
        cout.tie(0);
        int n;
        cin >> n;
        a.resize(n);
    for (int i = 0; i < n; i++){
        cin >> a[i].x >> a[i].y;
        a[i].id = i + 1;
    }
    pt p, q;
    sort(all(a), cmp);
    cin >> p.x >> p.y >> q.x >> q.y;
    if ((a[0].x == a[1].x) && (a[0].dist() == a[1].dist()))
            cout << -1;
        else
            cout << a[0].id;
        return 0;
}
```

Task F (24)

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

using namespace std;

#define all(x) x.begin(), x.end()
#define len(x) int(x.size())

typedef long long ll;

const int N = 1e5 + 10;

ll a[N][2];

int n;
ll k;

ll solve(){
    ll ans = -1;

    return ans;
}

int main(){
        #ifdef HOME
        freopen("input.txt", "rt", stdin);
        #endif //HOME
        ios_base::sync_with_stdio(0);
        cin.tie(0);
        cout.tie(0);
        srand(time(nullptr));
        cin >> n >> k;
        for (int i = 0; i < n; i++)
                cin >> a[i][0] >> a[i][1];
    ll ans = -1;
    mt19937 rnd(228228239 + 239);

     while(clock() < CLOCKS_PER_SEC * 0.5){
        ll ra = 0, rb = 0;
        ll res = 0;
        for (int i = 0; i < n; i++){
            if (rnd() % 3 == 2) rb += k;
            else ra += k;
            if (ra > a[i][0]){
                res += a[i][0];
                ra -= a[i][0];
            }
            else{
                res += ra;
                ra = 0;
            }
            if (rb > a[i][1]){
                res += a[i][1];
                rb -= a[i][1];
            }
            else{
                res += rb;
                rb = 0;
            }
        }
        if (ans < res){
            ans = res;
        }
    }

        while(clock() < CLOCKS_PER_SEC * 0.98){
        ll ra = 0, rb = 0;
        ll res = 0;
        for (int i = 0; i < n; i++){
            if (rnd() % 3 == 0) ra += k;
```

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            else rb += k;
            if (ra > a[i][0]){
                res += a[i][0];
                ra -= a[i][0];
            }
            else{
                res += ra;
                ra = 0;
            }
            if (rb > a[i][1]){
                res += a[i][1];
                rb -= a[i][1];
            }
            else{
                res += rb;
                rb = 0;
            }
        }
        if (ans < res){
            ans = res;
        }
    }


    cout << ans;
        return 0;
}
```