Олимпиада СПбГУ по информатике 2018/19 учебного года

Ткаченко Эдуард Витальевич

A	B	C	D	E	F	Sum
100	100	100	60	5	0	365

Task A (100)

```cpp
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <assert.h>

using namespace std;

#define all(x) x.begin(), x.end()
#define rall(x) x.rbegin(), x.rend()
#define rep(i, a, n) for(int i = a; i < n; ++i)
#define per(i, a, n) for(int i = n - 1; i >= 0; --i)
#define fastio ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
#define int long long

typedef vector<int> VI;
typedef vector<VI> VVI;
typedef pair<int, int> PII;

void solve()
{
    int n, m;
    cin >> n >> m;
    while (n < m)
    {
        n *= 2;
    }
    if (n == m)
        cout << "YES";
    else
        cout << "NO";
}

signed main()
{
    fastio;
    int q = 1;

    while (q--)
    {
        solve();
    }
    return 0;
}
```

Task B (100)

```cpp
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <assert.h>

using namespace std;

#define all(x) x.begin(), x.end()
#define rall(x) x.rbegin(), x.rend()
#define rep(i, a, n) for(int i = a; i < n; ++i)
#define per(i, a, n) for(int i = n - 1; i >= 0; --i)
#define fastio ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
#define int long long

typedef vector<int> VI;
typedef vector<VI> VVI;
typedef pair<int, int> PII;

void solve()
{
    string s;
    int n;
    cin >> n >> s;
    rep(i, 1, s.size())
    {
        if (s[i] == 'r' && s[i - 1] == 'o' ||
            s[i] == 'o' && s[i - 1] == 'r' ||
            i + 1 < n && s[i - 1] == 'o' && s[i + 1] == 'r')
        {
            cout << "Yes";
            return;
        }
    }
    cout << "No";
}

signed main()
{
    fastio;
    int q = 1;

    while (q--)
    {
        solve();
    }
    return 0;
}
```

Task C (100)

```cpp
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <assert.h>

using namespace std;

#define all(x) x.begin(), x.end()
#define rall(x) x.rbegin(), x.rend()
#define pb push_back
#define rep(i, a, n) for(int i = a; i < n; ++i)
#define per(i, a, n) for(int i = n - 1; i >= 0; --i)
#define fastio ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
#define int long long

typedef vector<int> VI;
typedef vector<VI> VVI;
typedef pair<int, int> PII;

int n;
VVI g;
int dp[100001];
int ans[100001];

void dfs(int u, int pr = -1)
{
        dp[u] = 1;
        for (auto & to : g[u])
        {
                if (to != pr)
                {
                        dfs(to, u);
                        dp[u] += dp[to];
                }
        }

}

void dfs2(int u, int pr = -1)
{
        VI siz_to(g[u].size());
        int i = 0;
        for (auto & to : g[u])
        {
                if (to != pr)
                {
                        siz_to[i] = dp[to];
                        dfs2(to, u);
                }
                else
                {
                        siz_to[i] = n - dp[u];
                }
                i++;
        }
        sort(rall(siz_to));
        if (siz_to.size() == 1)
                ans[u] = n;
        else
                ans[u] = siz_to[0] + 1;
}

void solve()
{
        cin >> n;
        g.resize(n + 1);
        rep(i, 0, n - 1)
        {
```

```cpp
                int u, v;
                cin >> u >> v;
                g[u].pb(v);
                g[v].pb(u);
        }
        if (n == 1)
        {
                cout << 1;
                return;
        }
        dfs(1);
        dfs2(1);
        rep(i, 1, n + 1)
                cout << ans[i] << " ";
}

signed main()
{
        fastio;
        int q = 1;

        while (q--)
        {
                solve();
        }
        return 0;
}
```

Task D (60)

```cpp
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <assert.h>

using namespace std;


#define all(x) x.begin(), x.end()
#define rall(x) x.rbegin(), x.rend()
#define pb push_back
#define rep(i, a, n) for(int i = a; i < n; ++i)
#define per(i, a, n) for(int i = n - 1; i >= a; --i)
#define fastio ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
#define int long long

typedef vector<int> VI;
typedef vector<VI> VVI;
typedef pair<int, int> PII;

string code(string & s)
{
        string res(6, '0');
        int prev_s = s[6];
        res[0] = s[6];
        rep(i, 1, 6)
        {
                int sum = s[i];
                res[i] = (26 + (sum - 97) - (prev_s - 97)) % 26 + 97;
                prev_s = res[i];
        }
        return res;
}

void solve()
{
        int t, n, p;
        string tmp22;
        cin >> tmp22;
        cin >> t >> n >> p;
        if (tmp22 == "split")
        {
                rep(ii, 0, t)
                {
                        string s;
                        cin >> s;
                        string res1(7, '0'), res2(7, '0'), res3(7, '0');
                        res1[0] = 'a';
                        res1[6] = s[0];
                        res2[0] = 'b';
                        res2[6] = s[3];
                        res3[0] = 'c';
                        rep(i, 1, 6)
                        {
                                res1[i] = (s[i] - 97 + s[i - 1] - 97) % 26 + 97;
                        }
                        rep(i, 4, 9)
                        {
                                res2[i - 3] = (s[i] - 97 + s[i - 1] - 97) % 26 + 97;
                        }
                        res3[1] = (s[0] - 97 + s[1] - 97) % 26 + 97;
                        res3[2] = (s[1] - 97 + s[2] - 97) % 26 + 97;
                        res3[3] = (s[2] - 97 + s[3] - 97) % 26 + 97;
                        res3[4] = (s[5] - 97 + s[6] - 97) % 26 + 97;
                        res3[5] = (s[6] - 97 + s[7] - 97) % 26 + 97;
                        res3[6] = (s[7] - 97 + s[8] - 97) % 26 + 97;
                        if (n == 3)
                                cout << res1 << "_" << res2 << "_" << res3;
```

```cpp
                        else
                                cout << res1 << " " << res1 << " " << res2 << " " << res3 << " "
                                    << res3;
                        cout << endl;
                }
                return;
        }
        rep(ii, 0, t)
        {
                string s1 = "", s2 = "", s3 = "";
                rep(i, 0, (n + 1) / 2)
                {
                        string tmp;
                        cin >> tmp;
                        if (tmp[0] == 'a')
                        {
                                s1 = tmp;
                        }
                        else if (tmp[0] == 'b')
                                s2 = tmp;
                        else
                                s3 = tmp;
                }
                if (s1.size() > 0 && s2.size() > 0)
                {
                        string res1 = code(s1), res2 = code(s2);
                        rep(i, 0, 6)
                                cout << res1[i];
                        rep(i, 3, 6)
                                cout << res2[i];
                        cout << '\n';
                }
                else if (s2.size() > 0 && s3.size() > 0)
                {
                        string res1 = code(s2);
                        string ans(9, '0');
                        rep(i, 3, 9)
                                ans[i] = res1[i - 3];
                        int prev_s = res1[0];
                        per(i, 0, 3)
                        {
                                int sum = s3[i + 1];
                                ans[i] = (26 + (sum - 97) - (prev_s - 97)) % 26 + 97;
                                prev_s = ans[i];
                        }
                        cout << ans << '\n';
                }
                else if (s1.size() > 0 && s3.size() > 0)
                {
                        string res1 = code(s1);
                        string ans(9, '0');
                        rep(i, 0, res1.size())
                                ans[i] = res1[i];
                        int prev_s = res1[5];
                        rep(i, 6, 9)
                        {
                                int sum = s3[i - 2];
                                ans[i] = (26 + (sum - 97) - (prev_s - 97)) % 26 + 97;
                                prev_s = ans[i];
                        }
                        cout << ans << '\n';
                }
        }
}

signed main()
{
        //fastio;
        int q = 1;

        while (q--)
        {
                solve();
        }
```

```
        return 0;
}



/*
merge
4 3 7
bokfuvs cpskfuv
baaaaaa cbhaaaa
baaaaaa caaaaaa
bvjkfui calikfu
*/
```

Task E (5)

```cpp
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <assert.h>

using namespace std;

#define all(x) x.begin(), x.end()
#define rall(x) x.rbegin(), x.rend()
#define pb push_back
#define rep(i, a, n) for(int i = a; i < n; ++i)
#define per(i, a, n) for(int i = n - 1; i >= 0; --i)
#define fastio ios_base::sync_with_stdio(0); cin.tie(0); cout.tie(0);
#define int long long

typedef vector<int> VI;
typedef vector<VI> VVI;
typedef pair<int, int> PII;

const int INF = 1e9 + 50;

struct Point
{
    int x, y, nmb;
    Point (int x = 0, int y = 0)
    :x(x), y(y){}
};
int Nmb = 0;
istream & operator>>(istream & in, Point & a)
{
    a.nmb = Nmb++;
    return in >> a.x >> a.y;
}

bool cmp(const Point & a, const Point & b)
{
    return a.x < b.x || a.x == b.x && a.y < b.y;
}



void solve()
{
        int n;
        cin >> n;
        vector <Point> pts(n);
        rep(i, 0, n)
                cin >> pts[i];
        Point P, Q;
        cin >> P >> Q;
        sort(all(pts), cmp);
        if (n == 1)
        {
                cout << -1;
                return;
        }
        int X = pts.back().x;
        vector <Point> new_pts;
        int i = pts.size() - 1;
        while (i >= 0 && pts[i].x == X)
        {
                new_pts.pb(pts[i]);
                i--;
        }

        if (new_pts.size() == 1)
        {
            if (X >= 0)
```

8

```cpp
            cout << new_pts.back().nmb + 1;
        else
            cout << -1;
                return;
        }
        int y1 = -INF, y2 = -INF;
        int nmb1, nmb2;
        for (auto & el : new_pts)
        {
                if (el.y <= 0)
                {
                        y1 = el.y;
                        nmb1 = el.nmb;
                }
                else
                {
                        y2 = el.y;
                        nmb2 = el.nmb;
                }
        }
        if (X < 0 || y1 == -y2)
        {
                cout << -1;
                return;
        }
        if (-y1 < y2)
        {
                cout << nmb1 + 1;
        }
        else
        {
                cout << nmb2 + 1;
        }
}

signed main()
{
        fastio;
        int q = 1;

        while (q--)
        {
                solve();
        }
        return 0;
}
```

Task F (—)