Олимпиада СПбГУ по информатике 2018/19 учебного года

Милосердова Любовь Михайловна

A	B	C	D	E	F	Sum
100	100	100	0	100	7	407

Task A (100)

```cpp
#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";
    else
        cout << "No";
    return 0;
}
```

Task B (100)

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

using namespace std;

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

Task C (100)

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

using namespace std;

vector<int> used, ans, d, maxd;
vector<vector<int>> g;

void dfs(int v) {
    used[v] = 1;
    d[v] = 1;
    for (auto u: g[v]) {
        if (!used[u]) {
            dfs(u);
            d[v] += d[u];
            maxd[v] = max(maxd[v], d[u]);
        }
    }
}

int main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    int n;
    cin >> n;
    g.resize(n);
    d.resize(n);
    maxd.resize(n);
    used.resize(n);
    bool fl = 1;
    for (int i = 0; i < n - 1; i++) {
        int a, b;
        cin >> a >> b;
        if (a != b - 1 && b != a - 1)
            fl = 0;
        a--;
        b--;
        g[a].push_back(b);
        g[b].push_back(a);
    }
    dfs(0);
    for (int i = 0; i < n; i++)
        cout << max(maxd[i] + 1, n - d[i] + 1) << "␣";
    return 0;
}
```

Task D (0)

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

using namespace std;

string f1(string t1, string t2) {
    bool f = 1;
    for (int i = 3; i < 7; i++)
        if (t1[i] != t2[i - 2])
            f = 0;
    if (t1[1] != t2[0])
        f = 0;
    if (f)
        return t1 + t2[5] + t2[6];
    f = 1;
    if (t1[0] != t2[0] || t1[2] != t2[1] || t1[3] != t2[2] ||
        t1[5] != t2[3] || t1[6] != t2[4])
        f = 0;
    if (f)
        return t1 + t2[5] + t2[6];
    f = 1;
    if (t1[1] != t2[2] || t1[3] != t2[3] || t1[4] != t2[4] || t1[5] != t2[5] | t1[6] != t2[6])
        f = 0;
    if (f) {
        string st = "" + t2[0] + t1[0] + t2[1] + t1[1] + t1[2] + t1[3] + t1[4] + t1[5] + t1[6];
    } else
        return "";

}

int main() {
    string s;
    cin >> s;
    int tm, n, p;
    cin >> tm >> n >> p;
    if (n == 5) {
    int t = tm;
    if (s[0] == 's') {
        while(t--) {
            string t;
            cin >> t;
            for (int i = 0; i < 5; i++) {
                for (int j = i; j < 7 + i; j++)
                    cout << t[j % t.size()];
                cout << " ";
            }
            cout << "\n";
        }
    } else {
        vector<string> t(3);
        cin >> t[0] >> t[1] >> t[2];
        t[0] = t[0] + t[0];
        t[1] = t[1] + t[1];
        t[2] = t[2] + t[2];
        sort(t.begin(), t.end());
        do {
            int i = 0;
            while (i < n && t[0][i] != t[1][0])
                i++;
            int j = 0;
            while (j < n && t[1][j] != t[2][0])
                j++;
            bool f = 1;
            for (int k = 0; k < j + 7; k++)
                if (t[0][k] != t[1][k + i] || t[0][k] != t[2][k + i + j]) {
                    f = 0;
                    cout << k << endl;
                    break;
                }
```

```cpp
                if (f) {
                    for (int k = 0; k < i + j; k++)
                        cout << t[0][k];
                    for (int k = 0; k < 7 - i - j; k++)
                        cout << t[2][k];
                    cout << "\n";
                }
            } while (next_permutation(t.begin(), t.end()));
    }
    return 0;
    }
    if (s[0] == 's') {
        while (tm--) {
            string t;
            cin >> t;
            for (int i = 0; i < 7; i++)
                cout << t[i];
            cout << "␣";
            cout << t[1];
            for (int i = 3; i < 9; i++)
                cout << t[i];
            cout << "␣";
            cout << t[0] << t[2] << t[3];
            for (int i = 5; i < 9; i++)
                cout << t[i];
            cout << "\n";
        }
    } else {
        while (tm--) {
            string t1, t2;
            cin >> t1 >> t2;
            string ans = f1(t1, t2);
            if (ans.size()) {
                cout << ans << "\n";
                continue;
            }
            ans = f1(t2, t1);
            cout << ans << "\n";
        }
    }
    return 0;
}
```

Task E (100)

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

using namespace std;

struct vect {
    long double x, y;
    vect(long double x1, long double y1) : x(x1), y(y1) {};
};

int main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);
    long long n;
    cin >> n;
    vector<pair<long double, long double>> t(n);
    for (int i = 0; i < n; i++) {
        cin >> t[i].first >> t[i].second;
    }
    long double x1, y1, x2, y2;
    cin >> x1 >> y1 >> x2 >> y2;
    for (int i = 0; i < n; i++) {
        int x = t[i].first, y = t[i].second;
        vect v(x2 - x1, y2 - y1), u(x - x1, y - y1);
        long double h = (v.x * u.x + v.y * u.y) / (sqrt(v.x * v.x + v.y * v.y));
        t[i] = {h, sqrt(u.x * u.x + u.y * u.y - h * h)};
    }
    int ind = 0;
    for (int i = 0; i < n; i++) {
        //cout << t[i].first << " " << t[i].second << endl;
        if (t[i].first > t[ind].first) {
            ind = i;
        } else {
            if (t[i].first == t[ind].first && abs(t[i].second) < abs(t[ind].second))
                ind = i;
        }
    }
    for (int i = 0; i < n; i++) {
        if (i == ind)
            continue;
        if (t[i].first == t[ind].first && abs(t[i].second) == abs(t[ind].second)) {
                cout << -1;
                return 0;
        }
    }
    cout << ind + 1;
    return 0;
}
```

Task F (7)

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

using namespace std;

int main() {
    int n, k;
    cin >> n >> k;
    vector<pair<int, int>> rb(n);
    for (int i = 0; i < n; i++) {
        cin >> rb[i].first >> rb[i].second;
    }
    int ans = 0;
    for (int i = 0; i < (1 << n); i++) {
        int r = 0, b = 0, cnt = 0;
        for (int j = 0; j < n; j++) {
            if ((i & (1 << j)))
                r += k;
            else
                b += k;
            cnt += min(r, rb[j].first) + min(b, rb[j].second);
            r -= min(r, rb[j].first);
            b -= min(b, rb[j].second);
        }
        if (cnt > ans)
            ans = cnt;
    }
    cout << ans;
    return 0;
}
```