

# Олимпиада СПбГУ по информатике 2018/19 учебного года

Гордиенко Максим Александрович

| A   | B   | C   | D  | E | F | Sum |
|-----|-----|-----|----|---|---|-----|
| 100 | 100 | 100 | 60 | 0 | 7 | 367 |

## Task A (100)

```
#include <iostream>
#include <vector>
#include <functional>
#include <algorithm>
#include <iomanip>
#include <string>
#include <set>
#include <map>
#include <stack>
#include <queue>
#include <cmath>

using namespace std;

#define endl '\n'
#define int long long int

#define MOD1 1e9+7
#define MOD2 1e9+21

signed main()
{
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int n, m;
    cin >> n >> m;
    while (n < m)
    {
        n *= 2;
    }
    if (n == m)
    {
        cout << "YES";
    }
    else {
        cout << "NO";
    }
    //system("pause");
}
```

## Task B (100)

```
#include <iostream>
#include <vector>
#include <functional>
#include <algorithm>
#include <iomanip>
#include <string>
#include <set>
#include <map>
#include <stack>
#include <queue>
#include <cmath>

using namespace std;

#define endl '\n'
#define int long long int

#define MOD1 1e9+7
#define MOD2 1e9+21

signed main()
{
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int n;
    cin >> n;
    string str;
    cin >> str;
    for (int i = 0; i + 1 < str.size(); ++i)
    {
        if (str[i] == 'o' && str[i + 1] == 'r') {
            cout << "YES";
            return 0;
        }
        if (str[i] == 'r' && str[i + 1] == 'o') {
            cout << "YES";
            return 0;
        }
    }
    for (int i = 1; i + 1 < str.size(); ++i) {
        if (str[i - 1] == 'o' && str[i + 1] == 'r') {
            cout << "YES";
            return 0;
        }
    }
    cout << "NO";
    //system("pause");
}
```

## Task C (100)

```
#include <iostream>
#include <vector>
#include <functional>
#include <algorithm>
#include <iomanip>
#include <string>
#include <set>
#include <map>
#include <stack>
#include <queue>
#include <cmath>

using namespace std;

#define endl '\n'
#define int long long int

#define MOD1 1e9+7
#define MOD2 1e9+21

vector<vector<int>>>g;
vector<bool>wss;
vector<int>cnt;

void dfs(int u) {
    wss[u] = true;
    cnt[u] = 1;
    for (int v : g[u])
    {
        if (!wss[v]) {
            dfs(v);
            cnt[u] += cnt[v];
        }
    }
}

signed main()
{
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int n;
    cin >> n;
    g.resize(n);
    for (int i = 0; i < n - 1; ++i)
    {
        int u, v;
        cin >> u >> v;
        --u;
        --v;
        g[u].push_back(v);
        g[v].push_back(u);
    }
    wss.resize(n);
    cnt.resize(n);
    dfs(0);
    queue < pair<int, int>>q;
    vector<bool>was(n);
    was[0] = true;
    q.emplace(0, 0);
    vector<int>ans(n);
    while (!q.empty())
    {
        int u = q.front().first;
        int prc = q.front().second;
        q.pop();
        for (int v : g[u])
        {
            if (!was[v]) {
                was[v] = true;

```

```

                                q.emplace(v, n - cnt[v]);
                                prc = max(prc, cnt[v]);
                            }
                        }
                    ans[u] = prc;
                }
            for (int i = 0; i < n; ++i)
            {
                cout << ans[i]+1 << '⌒';
            }
            //system("pause");
        }
    }
}

```

## Task D (60)

```
#include <iostream>
#include <vector>
#include <functional>
#include <algorithm>
#include <iomanip>
#include <string>
#include <set>
#include <map>
#include <stack>
#include <queue>
#include <cmath>

using namespace std;

#define endl '\n'
#define int long long int

#define MOD1 1e9+7
#define MOD2 1e9+21

void sub1()
{
    string s;
    cin >> s;
    int t, n, p;
    cin >> t >> n >> p;
    if (s[0] == 's') {
        for (int i = 0; i < t; ++i)
        {
            string par;
            cin >> par;

            string pr = "p"+par.substr(0, 6);
            string md = "m" + par.substr(0, 3) + par.substr(6);
            string su = "s" + par.substr(3);

            cout << pr << ' ' << md << ' ' << su << endl;
        }
    }
    else {
        for (int i = 0; i < t; ++i)
        {
            string s1, s2;
            cin >> s1 >> s2;
            char f1 = s1[0], f2 = s2[0];
            if (f1 == 'p' && (f2 == 'm' || f2 == 's'))
            {
                cout << s1.substr(1) << s2.substr(4) << endl;
            }
            else if (f1 == 'm' && f2 == 'p')
            {
                cout << s2.substr(1) << s1.substr(4) << endl;
            }
            else if (f1 == 'm' && f2 == 's')
            {
                cout << s1.substr(1, 3) << s2.substr(1) << endl;
            }
            else if (f1 == 's' && (f2 == 'm' || f2 == 'p')) {
                cout << s2.substr(1, 3) << s1.substr(1) << endl;
            }
        }
    }
}

void sub2()
{
    string s;
    cin >> s;
```

```

int t, n, p;
cin >> t >> n >> p;
if (s[0] == 's') {
    for (int i = 0; i < t; ++i)
    {
        string par;
        cin >> par;

        string pr = "p" + par.substr(0, 6);
        string md = "m" + par.substr(0, 3) + par.substr(6);
        string su = "s" + par.substr(3);
        if (n == 3)
        {
            cout << pr << ' ' << md << ' ' << su << endl;
        }
        else if (n == 5)
        {
            cout << pr << ' ' << pr << ' ' << md << ' ' << su << ' ' << su <<
                endl;
        }
    }
}
else {
    for (int i = 0; i < t; ++i)
    {
        string s1, s2, s3;
        cin >> s1 >> s2;
        if (n == 5)
        {
            cin >> s3;
            if (s1[0] == s2[0])
            {
                swap(s2, s3);
            }
        }
        char f1 = s1[0], f2 = s2[0];
        if (f1 == 'p' && (f2 == 'm' || f2 == 's'))
        {
            cout << s1.substr(1) << s2.substr(4) << endl;
        }
        else if (f1 == 'm' && f2 == 'p')
        {
            cout << s2.substr(1) << s1.substr(4) << endl;
        }
        else if (f1 == 'm' && f2 == 's')
        {
            cout << s1.substr(1, 3) << s2.substr(1) << endl;
        }
        else if (f1 == 's' && (f2 == 'm' || f2 == 'p')) {
            cout << s2.substr(1, 3) << s1.substr(1) << endl;
        }
    }
}

}

/*
merge
4 3 7
ppasswo mpasrds
puhaaaa saaaaaa
maaaaaa saaaaaa
pplainw mplaord
*/

signed main()
{
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    sub2();
    //system("pause");
}

```

## Task E (0)

```
#include <iostream>
#include <vector>
#include <functional>
#include <algorithm>
#include <iomanip>
#include <string>
#include <set>
#include <map>
#include <stack>
#include <queue>
#include <cmath>

using namespace std;

#define endl '\n'
#define int long long int

#define MOD1 1e9+7
#define MOD2 1e9+21

signed main()
{
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int n;
    cin >> n;
    int x1, y1, x2, y2, xp, yp, xq, yq;
    cin >> x1 >> y1 >> x2 >> y2 >> xp >> yp >> xq >> yq;
    int c1 = 0, c2 = 0;
    for (int x = 0; x <= 1001; ++x)
    {
        if ((x2 - x)*(x2 - x) + (y2 - 0)*(y2 - 0) < (x1 - x)*(x1 - x) + (y1 - 0)*(y1 - 0))
        {
            c2++;
        }
        else if ((x2 - x)*(x2 - x) + (y2 - 0)*(y2 - 0) > (x1 - x)*(x1 - x) + (y1 - 0)*(y1 - 0))
        {
            c1++;
        }
    }
    if (c2 > c1) {
        cout << 2;
    }
    else if (c1 > c2) {
        cout << 1;
    }
    else {
        cout << -1;
    }
    /*if (x2 > x1) {
    cout << 2;
    }
    else if (x1 > x2) {
    cout << 1;
    }
    else {
    if (y2 > y1) {
    cout << 2;
    }
    else if (y1 > y2) {
    cout << 1;
    }
    else {
    cout << -1;
    }
    }*/
    //system("pause");
}
```

}



## Task F (7)

```
#include <iostream>
#include <vector>
#include <functional>
#include <algorithm>
#include <iomanip>
#include <string>
#include <set>
#include <map>
#include <stack>
#include <queue>
#include <cmath>

using namespace std;

#define endl '\n'
#define int long long int

#define MOD1 1e9+7
#define MOD2 1e9+21

signed main()
{
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int n, k;
    cin >> n >> k;
    vector<int> r(n), b(n);
    for (int i = 0; i < n; ++i)
        cin >> r[i] >> b[i];
    int ans = 0;
    for (int m = 0; m < (1 << n); ++m)
    {
        int i = 0;
        int cur = 0;
        int cr = 0, cb = 0;
        for (int i = 0; i < n; ++i)
        {
            if ((m & (1 << i)) == 0)
            {
                cr += k;
            }
            else {
                cb += k;
            }
            cur += min(cr, r[i]) + min(cb, b[i]);
            cr -= min(cr, r[i]);
            cb -= min(cb, b[i]);
        }
        ans = max(ans, cur);
    }
    cout << ans;
    //system("pause");
}
```