

Олимпиада СПбГУ по информатике 2018/19 учебного года

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A	B	C	D	E	F	Sum
100	100	100	60	100	24	484

Task A (100)

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

using namespace std;

typedef long long ll;
typedef long double ld;

int main()
{
    /* freopen("In.txt", "r", stdin);
    freopen("Out.txt", "w", stdout); */
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    int n, m;
    cin >> n >> m;
    if (m % n != 0) {
        cout << "No";
        return 0;
    }
    int ans = m / n;
    while (ans > 1) {
        if (ans % 2 == 1) {
            cout << "No";
            return 0;
        }
        ans /= 2;
    }
    cout << "Yes";
    return 0;
}
```

Task B (100)

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

using namespace std;

typedef long long ll;
typedef long double ld;

int main()
{
    /*freopen("In.txt", "r", stdin);
    freopen("Out.txt", "w", stdout);*/
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    int n;
    cin >> n;
    string s;
    cin >> s;
    for (int i = 0; i < s.length(); i++) {
        if (s[i] == 'o' && ((i < s.length() - 1 && (s[i + 1] == 'r' || i < s.length() - 2 && s[i + 2] == 'r')) || (i > 0 && s[i - 1] == 'r'))) {
            cout << "Yes";
            return 0;
        }
    }
    cout << "No";
    return 0;
}
```

Task C (100)

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

using namespace std;

typedef long long ll;
typedef long double ld;

vector<int> matr[200000];
int pr[200000];
int psize[200000];
map<int, int> mp[200000];

void dfs(int v, int prd) {
    pr[v] = prd;
    psize[v] = 1;
    for (int i = 0; i < matr[v].size(); i++) {
        int u = matr[v][i];
        if (u != prd) {
            dfs(u, v);
            psize[v] += psize[u];
        }
    }
}

int main()
{
    /*freopen("In.txt", "r", stdin);
    freopen("Out.txt", "w", stdout);*/
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    int n;
    cin >> n;
    int u, v;
    for (int i = 0; i < n - 1; i++) {
        cin >> u >> v;
        u--;
        v--;
        matr[v].push_back(u);
        matr[u].push_back(v);
    }
    dfs(0, -1);
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < matr[i].size(); j++) {
            u = matr[i][j];
            if (u == pr[i]) {
                mp[i][u] = psize[i];
            } else {
                mp[i][u] = n - psize[u];
                /*if (pr[i] == -1) {
                    mp[i][u] = psize[i] - psize[u];
                } else {
                    mp[i][u] = psize[pr[i]] - psize[u];
                }*/
            }
        }
    }
    for (int i = 0; i < n; i++) {
        int maxx = 0;
        for (int j = 0; j < matr[i].size(); j++) {
            u = matr[i][j];
            maxx = max(maxx, mp[u][i]);
        }
        cout << maxx + 1 << " ";
    }
    return 0;
}
```

Task D (60)

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

using namespace std;

typedef long long ll;
typedef long double ld;

string a[10];
char pass[10];

void zap(string t) {
    if (t[0] == 'a') {
        for (int i = 0; i < 6; i++)
            pass[i] = t[i + 1];
    }
    if (t[0] == 'b') {
        for (int i = 3; i < 9; i++)
            pass[i] = t[i - 2];
    }
    if (t[0] == 'c') {
        for (int i = 0; i < 3; i++)
            pass[i] = t[i + 1];
        for (int i = 6; i < 9; i++)
            pass[i] = t[i - 2];
    }
}

int main()
{
    /*freopen("In.txt", "r", stdin);
    freopen("Out.txt", "w", stdout);*/
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    string s;
    string pas;
    cin >> s;
    int t, n, p;
    cin >> t >> n >> p;
    if (s == "split") {
        for (int i = 0; i < t; i++) {
            cin >> pas;
            if (n == 3) {
                cout << "a" << pas.substr(0, 6) << "b" << pas.substr(3, 6) << "c" << pas.substr(0, 3) + pas.substr(6, 3);
            } else {
                cout << "a" << pas.substr(0, 6) << "b" << pas.substr(3, 6) << "a" << pas.substr(0, 6) << "b" << pas.substr(3, 6) << "c" << pas.substr(0, 3) + pas.substr(6, 3);
            }
            cout << "\n";
        }
    } else {
        for (int x = 0; x < t; x++) {
            for (int i = 0; i < n / 2 + 1; i++) {
                cin >> a[i];
            }
            int d = 1;
            if (a[0][0] == a[d][0])
                d++;
            zap(a[0]);
            zap(a[d]);
            for (int j = 0; j < 9; j++) {
                cout << pass[j];
            }
            cout << "\n";
        }
    }
    return 0;
}
```

Task E (100)

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

using namespace std;

typedef long long ll;
typedef long double ld;

struct P {
    ld x, y;

    void read() {
        cin >> x >> y;
    }
};

struct V {
    ld x, y, len, lenk;

    void make_v(P a, P b) {
        x = b.x - a.x;
        y = b.y - a.y;
        len = sqrt(x * x + y * y);
        lenk = x * x + y * y;
    }
};

ld sc(V a, V b) {
    return a.x * b.x + a.y * b.y;
}

P a[200000];

ld del = 1;

int main()
{
    /*freopen("In.txt", "r", stdin);
    freopen("Out.txt", "w", stdout);*/
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    int n;
    cin >> n;
    for (int i = 0; i < n; i++) {
        a[i].read();
    }
    P p, q;
    p.read();
    q.read();
    /*q.x -= p.x;
    q.y -= p.y;*/
    V napr, tek;
    napr.make_v(p, q);
    ld maxx = -1e18, dist, minn = 1e18, ud;
    int nm = -2;
    for (int i = 0; i < n; i++) {
        tek.make_v(p, a[i]);
        dist = sc(napr, tek) / napr.len;
        ud = tek.lenk - dist * dist;
        if (maxx == dist) {
            if (ud == minn)
                nm = -2;
            else {
                if (ud < minn) {
                    nm = i;
                    minn = ud;
                }
            }
        }
    }
}
```

```
        } else {  
            if (dist > maxx) {  
                nm = i;  
                maxx = dist;  
                minn = ud;  
            }  
        }  
    }  
    cout << nm + 1;  
    return 0;  
}
```

Task F (24)

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

using namespace std;

typedef long long ll;
typedef long double ld;

pair<ll, ll> a[2000];
int dp[40][1000][1000];

int main()
{
    /*freopen("In.txt", "r", stdin);
    freopen("Out.txt", "w", stdout);*/
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    ll n, k;
    cin >> n >> k;
    ll sum = 0;
    for (int i = 0; i < n; i++) {
        cin >> a[i].first >> a[i].second;
        sum += a[i].first + a[i].second;
    }
    for (ll i = n - 1; i >= 0; i--) {
        for (ll j = 0; j <= k * n; j++) {
            for (ll p = 0; p <= k * n; p++) {
                ll ans1 = min(a[i].first, j + k) + min(a[i].second, p) +
                    dp[i + 1][max((ll)0, j + k - a[i].first)][max((ll)0, p - a[i].second)];
                ll ans2 = min(a[i].first, j) + min(a[i].second, p + k) +
                    dp[i + 1][max((ll)0, j - a[i].first)][max((ll)0, p + k - a[i].second)];
                dp[i][j][p] = max(ans1, ans2);
            }
        }
    }
    cout << dp[0][0][0];
    return 0;
}
```