

Олимпиада СПбГУ по информатике 2022/23 учебного года

A	B	C	D	E	F	Sum
100	100	60	100	28	65	453

Task A ()

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

#define forn(i, n) for (int i = 0; i < int(n); i++)
#define debug(x) cout << #x << ":\n" << x << endl
#define ff first
#define ss second

using namespace std;
typedef long long ll;
typedef long double ld;

mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());
const ll N = 3e5 + 100, INF = 0x3f3f3f3f3f3f3f3f, MOD = 1e9 + 7, MOD2 = 1e9 + 9, M = 350;
const double eps = 1e-10;

ll x, ans[N];
vector<ll> a, b;

int main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    cout << fixed << setprecision(12);
#ifdef HOME_ZHEGLOV
    freopen("inp.txt", "r", stdin);
#endif
    forn(i, 6) {
        cin >> x;
        b.clear();
        forn(j, x - 1)
            b.push_back(a[j]);
        b.push_back(i);
        for (int j = x - 1; j < a.size(); j++)
            b.push_back(a[j]);
        swap(a, b);
    }
    forn(i, 6)
        ans[a[i]] = i;
    forn(i, 6)
        cout << ans[i] + 1 << "\n";
    return 0;
}
```

Task B ()

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

#define forn(i, n) for (int i = 0; i < int(n); i++)
#define debug(x) cout << #x << ": " << x << endl
#define ff first
#define ss second

using namespace std;
typedef long long ll;
typedef long double ld;

mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());
const ll N = 3e5 + 100, INF = 0x3f3f3f3f3f3f3f3f, MOD = 1e9 + 7, MOD2 = 1e9 + 9, M = 350;
const double eps = 1e-10;

ll n, x, sm;
string s;

int main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    cout << fixed << setprecision(12);
#ifdef HOME_ZHEGLOV
    freopen("inp.txt", "r", stdin);
#endif
    cin >> s;
    if (s == "first") {
        cin >> n;
        forn(i, n) {
            cin >> x;
            sm += x;
        }
        cout << sm * 100000;
        return 0;
    }
    cin >> n;
    forn(i, n) {
        cin >> x;
        sm += (x % 100000);
    }
    sm += x / 100000;
    cout << sm;
    return 0;
}
```

Task C ()

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

#define forn(i, n) for (int i = 0; i < int(n); i++)
#define debug(x) cout << #x << ": " << x << endl
#define ff first
#define ss second

using namespace std;
typedef long long ll;
typedef long double ld;

mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());
const ll N = 3e5 + 100, INF = 0x3f3f3f3f3f3f3f3f, MOD = 1e9 + 7, MOD2 = 1e9 + 9, M = 350;
const double eps = 1e-10;

struct rect{
    ll x, y;
};

set<pair<ll, ll>> ans;
ll x, y;
pair<ll, ll> go[N];

void check(rect a, rect b, rect c) {
    if (a.x == b.x && a.y >= b.y)
        ans.insert({min(a.x, a.y - b.y), max(a.x, a.y - b.y)});
    if (a.x == b.x && a.y >= b.y + c.y && a.x >= c.x)
        ans.insert({min(a.x - c.x, c.y), max(a.x - c.x, c.y)});

    if (a.x == b.x && a.y >= b.y + c.y && a.x >= c.x)
        ans.insert({min(a.x, a.y - b.y - c.y), max(a.x, a.y - b.y - c.y)});

    if (a.x >= b.x && a.y >= b.y + c.y && a.x >= c.x && a.x <= b.x + c.x)
        ans.insert({min(a.x - b.x, b.y), max(a.x - b.x, b.y)});
    if (a.x == b.x + c.x && b.y == c.y && b.y <= a.y)
        ans.insert({min(a.x, a.y - b.y), max(a.x, a.y - b.y)});
}

int main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    cout << fixed << setprecision(12);
#ifdef HOME_ZHEGLOV
    freopen("inp.txt", "r", stdin);
#endif
    forn(i, 3) {
        cin >> x >> y;
        go[i] = {x, y};
        if (x > y)
            swap(x, y);
        ans.insert({x, y});
    }

    forn(i, 3) {
        forn(j, 3) {
            if (i == j)
                continue;
            forn(u, 3) {
                if (u == i || u == j)
                    continue;
                forn(_, 4) {
                    forn(__, 4) {
                        forn(____, 4) {
                            check({go[i].ff, go[i].ss}, {go[j].ff, go[j].ss}, {go[u].ff, go[u].ss});
                            swap(go[2].ff, go[2].ss);
                        }
                        swap(go[1].ff, go[1].ss);
                    }
                    swap(go[0].ff, go[0].ss);
                }
            }
        }
    }
}
```

```
        }  
    }  
}  
for (auto v : ans)  
    if (v.ff > 0 && v.ss > 0)  
        cout << v.ff << "␣" << v.ss << "\n";  
return 0;  
}
```

Task D ()

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

#define forn(i, n) for (int i = 0; i < int(n); i++)
#define debug(x) cout << #x << " : " << x << endl
#define ff first
#define ss second

using namespace std;
typedef long long ll;
typedef long double ld;

mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());
const ll N = 3e5 + 100, INF = 0x3f3f3f3f3f3f3f3f, MOD = 1e9 + 7, MOD2 = 1e9 + 9, M = 350;
const double eps = 1e-10;

ll n, a[N], s[N];
bool b[N];

ll get_g(ll i) {
    if (b[i]) {
        if (a[i] == s[i])
            return a[i] + 1;
        else
            return a[i];
    }
    else {
        return a[i];
    }
}

void move() {
    ll x = 0;
    forn(i, n) {
        x ^= get_g(i);
    }
    forn(i, n) {
        if (!b[i]) {
            if (a[i] > (x ^ get_g(i))) {
                cout << i + 1 << " : " << a[i] - (x ^ a[i]) << endl;
                a[i] = (x ^ a[i]);
                return;
            }
        }
        else {
            if ((x ^ get_g(i)) == s[i]) {
                cout << i + 1 << " : " << 0 << endl;
                a[i] = s[i];
                b[i] = false;
                return;
            }
            if (a[i] > (x ^ get_g(i))) {
                cout << i + 1 << " : " << a[i] - (x ^ get_g(i)) << endl;
                a[i] = (x ^ get_g(i));
                return;
            }
        }
    }
}

void move_j() {
    ll i, y;
    cin >> i >> y; i--;
    if (y == -1)
        exit(0);
    if (y == 0) {
        a[i] = s[i];
        b[i] = false;
    }
    else
        a[i] -= y;
}
```

```

int main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    cout << fixed << setprecision(12);
#ifdef HOME_ZHEGLOV
    //freopen("inp.txt", "r", stdin);
#endif
    cin >> n;
    forn(i, n) {
        b[i] = true;
        cin >> s[i];
        a[i] = s[i];
    }

    ll x = 0;
    forn(i, n) {
        x ^= get_g(i);
    }
    if (x == 0) {
        cout << "-1_-1" << endl;
        exit(0);
    }
    while (true) {
        move();
        move_j();
    }
    return 0;
}

```

Task E ()

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

#define forn(i, n) for (int i = 0; i < int(n); i++)
#define debug(x) cout << #x << ": " << x << endl
#define ff first
#define ss second

using namespace std;
typedef long long ll;
typedef long double ld;

mt19937 rnd(72);
const ll N = 3e5 + 100, INF = 0x3f3f3f3f3f3f3f3f, MOD = 1e9 + 7, MOD2 = 1e9 + 9, M = 350;
const double eps = 1e-10;

ll t, n, cnt;
string s;
ll dp[10][11];
ll z = 0;
map<vector<ll>, ll> from;
map<ll, vector<ll>> to;
vector<ll> tmp;
vector<ll> rnum;
void go() {
    if (tmp.size() == 10) {
        to[rnum[z]] = tmp;
        from[tmp] = rnum[z];
        z++;
        return;
    }
    ll st = 0;
    if (!tmp.empty()) {
        st = tmp[tmp.size() - 1];
    }
    for (ll j = st; j <= 10; j++) {
        tmp.push_back(j);
        go();
        tmp.pop_back();
    }
}

int main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    cout << fixed << setprecision(12);
#ifdef HOME_ZHEGLOV
    freopen("inp.txt", "r", stdin);
#endif
    for (int i = 1; i <= 200000; i++)
        rnum.push_back(i);
    shuffle(rnum.begin() + 100000, rnum.end(), rnd);
    go();
    cin >> t;
    cin >> s;
    if (s == "transmit") {
        while (t--) {
            cin >> n;
            for (auto g : to[n]) {
                forn(i, 10) {
                    if (i < g)
                        cout << 1;
                    else
                        cout << 0;
                }
                cout << "\n";
            }
            cout << "\n";
        }
        return 0;
    }
}
```

```

while (t--) {
    tmp.clear();
    cnt = 0;
    char c;
    forn(_, 10) {
        cnt = 0;
        forn(i, 10) {
            cin >> c;
            cnt += c - '0';
        }
        tmp.push_back(cnt);
    }
    sort(tmp.begin(), tmp.end());
    cout << from[tmp] << "\n";
}
return 0;
}

```


Task F ()

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

#define forn(i, n) for (int i = 0; i < int(n); i++)
#define debug(x) cout << #x << " : " << x << endl
#define ff first
#define ss second

using namespace std;
typedef long long ll;
typedef long double ld;

mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());
const ll N = 3e5 + 100, INF = 0x3f3f3f3f3f3f3f3f, MOD = 1e9 + 7, MOD2 = 1e9 + 9, M = 350;
const double eps = 1e-10;

string s;
deque<pair<ll, ll>> a, b;
vector<pair<ll, ll>> aa, bb, ans;
int main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    cout << fixed << setprecision(12);
#ifdef HOME_ZHEGLOV
    freopen("inp.txt", "r", stdin);
#endif
    cin >> s;
    forn(i, s.size()) {
        if (s[i] != '(') {
            a.push_back({ll(s[i] - '0'), 1});
        }
        else {
            i++;
            ll z = s[i] - '0';
            string cnt = "";
            i += 2;
            while (s[i] != ')') {
                cnt.push_back(s[i]);
                i++;
            }
            a.push_back({z, stoll(cnt)});
        }
    }
    reverse(a.begin(), a.end());
    cin >> s;
    forn(i, s.size()) {
        if (s[i] != '(') {
            b.push_back({ll(s[i] - '0'), 1});
        }
        else {
            i++;
            ll z = s[i] - '0';
            string cnt = "";
            i += 2;
            while (s[i] != ')') {
                cnt.push_back(s[i]);
                i++;
            }
            b.push_back({z, stoll(cnt)});
        }
    }
    reverse(b.begin(), b.end());
    while (!a.empty() || !b.empty()) {
        if (a.empty()) {
            aa.push_back({0, b.front().ss});
            bb.push_back(b.front());
            b.pop_front();
            continue;
        }
        if (b.empty()) {
            aa.push_back(a.front());
            bb.push_back({0, a.front().ss});
        }
    }
```

```

        a.pop_front();
        continue;
    }
    if (a.front().ss == b.front().ss) {
        aa.push_back(a.front());
        bb.push_back(b.front());
        a.pop_front();
        b.pop_front();
        continue;
    }
    if (a.front().ss < b.front().ss) {
        aa.push_back(a.front());
        bb.push_back({b.front().ff, a.front().ss});
        pair<ll, ll> z = {b.front().ff, b.front().ss - a.front().ss};
        a.pop_front();
        b.pop_front();
        b.push_front(z);
        continue;
    }
    aa.push_back({a.front().ff, b.front().ss});
    bb.push_back(b.front());
    pair<ll, ll> z = {a.front().ff, a.front().ss - b.front().ss};
    a.pop_front();
    b.pop_front();
    a.push_front(z);
}
ll add = 0;
for (i, aa.size()) {
    ans.push_back(({aa[i].ff + bb[i].ff + add) % 10, 1});
    add = (aa[i].ff + bb[i].ff + add) / 10;
    aa[i].ss--;
    if (aa[i].ss == 0)
        continue;
    if (add) {
        ans.push_back(({aa[i].ff + bb[i].ff + add) % 10, aa[i].ss});
    }
    else {
        ans.push_back({aa[i].ff + bb[i].ff, aa[i].ss});
    }
}
if (add)
    ans.push_back({1, 1});
reverse(ans.begin(), ans.end());
for (auto [v, u] : ans) {
    if (u == 1)
        cout << v;
    else
        cout << "(" << v << "|" << u << ")";
}
return 0;
}

```