Олимпиада СПбГУ
по информатике
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A	B	C	D	E	F	sum
100	100	100	100	20	90	510

Task A

```
#include<bits/stdc++.h>
#define x first
#define y second
#define sz(a) (int)a.size()
#define pb push_back
#define int long long

using namespace std;

int dp[100];

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    int a, b, n;
    cin >> a >> b >> n;
    int ans = 0;
    if (n >= a) {
        for (int i = 0; i < a; ++i) {
            fill(dp, dp + 100, 0);
            dp[i] = 1;
            for (int j = i + 1; j < n - (a - i) + 1; ++j) {
                if (j - b >= 0) {
                    dp[j] += dp[j - b];
                }
                if (j - a >= 0) {
                    dp[j] += dp[j - a];
                }
            }
```

```
            ans += dp[n - (a - i)];
        }
    }
    if (n >= b) {
        for (int i = 0; i < b; ++i) {
            fill(dp, dp + 100, 0);
            dp[i] = 1;
            for (int j = i + 1; j < n - (b - i) + 1; ++j) {
                if (j - b >= 0) {
                    dp[j] += dp[j - b];
                }
                if (j - a >= 0) {
                    dp[j] += dp[j - a];
                }
            }
            ans += dp[n - (b - i)];
        }
    }
    cout << ans;
    return 0;
}
```

Task B

```
#include<bits/stdc++.h>
#define x first
#define y second
#define sz(a) (int)a.size()
#define pb push_back
#define int long long

using namespace std;

map<pair<int, pair<int, int>>, int> m;

vector<int> dp[6] = {{1, 0, -1}, {0, 1, -1}, {-1, 1, 0}, {-1, 0, 1}, {0,
    -1, 1}, {1, -1, 0}};

int n;

bool check(pair<int, pair<int, int>> a) {
    if (abs(a.x) > n || abs(a.y.x) > n || abs(a.y.y) > n) {
        return false;
    }
    return true;
}

int get(pair<int, pair<int, int>> a, pair<int, pair<int, int>> b) {
    return max({abs(a.x - b.x), abs(a.y.x - b.y.x), abs(a.y.y - b.y.y)});
}

signed main() {
    ios_base::sync_with_stdio(0);
```

```
    cin.tie(0);
    cin >> n;
    pair<int, pair<int, int>> a, b;
    cin >> a.x >> a.y.x >> a.y.y;
    cin >> b.x >> b.y.x >> b.y.y;
    vector<int> ans = {get(a, b)};
    ans.pb(get(a, {b.x - 2 * n, {b.y.x + n, b.y.y + n}}));
    ans.pb(get(a, {b.x + 2 * n, {b.y.x - n, b.y.y - n}}));
    ans.pb(get(a, {b.x + n, {b.y.x - 2 * n, b.y.y + n}}));
    ans.pb(get(a, {b.x - n, {b.y.x + 2 * n, b.y.y - n}}));
    ans.pb(get(a, {b.x + n, {b.y.x + n, b.y.y - 2 * n}}));
    ans.pb(get(a, {b.x - n, {b.y.x - n, b.y.y + 2 * n}}));
    cout << *min_element(ans.begin(), ans.end());
    return 0;
}
```

Task C

```
#include<bits/stdc++.h>
#define x first
#define y second
#define sz(a) (int)a.size()
#define pb push_back
#define int long long

using namespace std;

void solve1();
void solve2();

const int mod = 1e9 + 7;
const int k = 3;

int st[100010];

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    st[0] = 1;
    for (int i = 1; i <= 100000; ++i) {
        st[i] = (st[i - 1] * k) % mod;
    }
    string s;
    cin >> s;
    if (s == "first") {
        solve1();
    } else {
        solve2();
    }
    return 0;
}

int pref[100010];
```

```
void solve1() {
    string s;
    int n;
    cin >> n;
    cin >> s;
    for (int i = 0; i < n; ++i) {
        pref[i + 1] = (pref[i] + (s[i] - '0' + 1) * st[i]) % mod;
    }
    cout << pref[n] << '\n';
}

void solve2() {
    string s;
    int n;
    int h;
    cin >> n;
    cin >> s;
    cin >> h;
    for (int i = 0; i < n; ++i) {
        pref[i + 1] = (pref[i] + (s[i] - '0' + 1) * st[i]) % mod;
    }
    h = (h * st[100000]) % mod;
    int p;
    for (int i = 0; i < n; ++i) {
        p = (pref[n] - pref[i] + mod);
        p %= mod;
        p = (p + pref[i] * st[n]) % mod;
        p = (p * st[100000 - i]) % mod;
        if (p == h) {
            cout << "YES\n";
            return;
        }
    }
    cout << "NO\n";
}
```

Task D

```
#include<bits/stdc++.h>
#define x first
#define y second
#define sz(a) (int)a.size()
#define pb push_back
#define int long long

using namespace std;

vector<char> v;

vector<pair<int, int>> q;

signed main() {
```

```
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    int n;
    cin >> n;
    char c;
    while (true) {
        int k = ((sz(v) == 0) ? n : n - 1);
        for (int i = 0; i < k; ++i) {
            cout << "1 1" << endl;
            cin >> c;
            if (c == '!') {
                return 0;
            }
            v.pb(c);
        }
        q.clear();
        bool f = false;
        for (int i = 0; i < sz(v); ++i) {
            if (i == n - 1) {
                continue;
            } else {
                if (v[i] == '>') {
                    q.pb({i, i + 1});
                }
            }
        }
        for (int i = 0; i < n; ++i) {
            if (sz(q) > 0) {
                cout << (q.back().x - i + n) % n + 1 << ' ' << (q.back().
    y - i + n) % n + 1 << endl;
                cin >> c;
                if (c == '!') {
                    return 0;
                }
                q.pop_back();
            } else {
                cout << "1 1" << endl;
                cin >> c;
                if (c == '!') {
                    return 0;
                }
            }
        }
        v.clear();
    }
    return 0;
}
```

Task E

```
#include<bits/stdc++.h>
#define x first
#define y second
```

```
#define sz(a) (int)a.size()
#define pb push_back
#define int long long

using namespace std;

deque<int> g[100010];

int t[100010];

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    int n, q;
    cin >> n >> q;
    int k, x;
    for (int i = 0; i < n; ++i) {
        cin >> k;
        for (int j = 0; j < k; ++j) {
            cin >> x;
            g[i].pb(x - 1);
        }
    }
    int uk = 0;
    for (int i = 0; i < q; ++i) {
        cin >> t[i];
    }
    int st = 0;
    for (int i = 0; i <= t[q - 1]; ++i) {
        if (t[uk] == i) {
            cout << st + 1 << ' ';
            ++uk;
        }
        g[st].pb(g[st].front());
        g[st].pop_front();
        st = g[st].back();
    }
    return 0;
}
```

Task F

```
#include<bits/stdc++.h>
#define x first
#define y second
#define sz(a) (int)a.size()
#define pb push_back
#define int long long

using namespace std;

char ans[51][51];
int pans = 0;
```

```
char buf[51][51];
int bans = 0;

int a[51][51];

int dx[2] = {0, -1};
int dy[2] = {1, 0};

int n, m;

int check(int x, int y, int d) {
    if (ans[x][y] != '.') {
        return -1;
    }
    if (ans[(x + dx[d] + n) % n][(y + dy[d]) % m] != '.') {
        return -1;
    }
    return a[x][y] * a[(x + dx[d] + n) % n][(y + dy[d]) % m];
}

string s[51];

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cin >> n >> m;
    for (int i = 0; i < n; ++i) {
        cin >> s[i];
    }
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < m; ++j) {
            a[i][j] = s[i][j] - '0';
            ans[i][j] = '.';
            buf[i][j] = '.';
        }
    }
    int f, mx, ind1, ind2, dind;
    for (int i = 0; i < 10000; ++i) {
        mx = 0;
        for (int j = 0; j < n; ++j) {
            for (int k = 0; k < m; ++k) {
                for (int d = 0; d < 2; ++d) {
                    f = check(j, k, d);
                    if (f > mx) {
                        mx = f;
                        ind1 = j, ind2 = k, dind = d;
                    }
                }
            }
        }
        if (mx == 0) {
            break;
```

```
        }
        if (dind == 1) {
            ans[ind1][ind2] = 'B';
            ans[(ind1 - 1 + n) % n][ind2] = 'T';
        } else {
            ans[ind1][ind2] = 'L';
            ans[ind1][(ind2 + 1) % m] = 'R';
        }
        pans += mx;
    }
    cout << pans << '\n';
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < m; ++j) {
            cout << ans[i][j];
        }
        cout << '\n';
    }
    return 0;
}
```