Олимпиада СПбГУ
по информатике
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A	B	C	D	E	F	sum
100	50	100	100	20	47	417

Task A

```
///@author: suuuiii
//#pragma GCC target("avx2,fma")
//#pragma GCC optimize("Ofast")
//#pragma GCC optimize("O3")

#include <bits/stdc++.h>
#include <ext/pb_ds/assoc_container.hpp>

#define int128 __int128
#define int long long
#define ll long long
#define ld long double
#define ve vector
#define all(a) (a).begin(), (a).end()
#define rall(a) (a).rbegin(), (a).rend()
#define pb push_back
#define eb emplace_back
#define INF1 INT32_MAX
#define INF2 INT64_MAX
#define sz(x) (int)(x).size()


using namespace std;
using namespace __gnu_pbds;

random_device rd;
mt19937 rnd(rd());

template<typename key, typename cmp = less_equal<>>
```

```
using pbds = tree<key, null_type, cmp, rb_tree_tag,
    tree_order_statistics_node_update>;

const int mod = 998244353, maxn = 1e5+1;

int n, a, b, ans = 0;

void solve() {
    cin >> a >> b >> n;
    ve<int> dp(n+1);

    dp[0] = 1;

    for (int i = 1; i <= n; ++i) {
        if (i >= a) dp[i] += dp[i-a];
        if (i >= b) dp[i] += dp[i-b];
    }

    cout << (n >= a ? dp[n-a]*a : 0) + (n >= b ? dp[n-b]*b : 0);
}


signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tt = 1;
//    cin >> tt;
    while (tt--) {
        solve();
    }
}
```

Task B

```
///@author: suuuiii
//#pragma GCC target("avx2,fma")
//#pragma GCC optimize("Ofast")
//#pragma GCC optimize("O3")

#include <bits/stdc++.h>
#include <ext/pb_ds/assoc_container.hpp>

#define int128 __int128
#define int long long
#define ll long long
#define ld long double
#define ve vector
#define all(a) (a).begin(), (a).end()
#define rall(a) (a).rbegin(), (a).rend()
#define pb push_back
#define eb emplace_back
#define INF1 INT32_MAX
#define INF2 INT64_MAX
```

```
#define sz(x) (int)(x).size()


using namespace std;
using namespace __gnu_pbds;

random_device rd;
mt19937 rnd(rd());

template<typename key, typename cmp = less_equal<>>
using pbds = tree<key, null_type, cmp, rb_tree_tag,
    tree_order_statistics_node_update>;

const int mod = 2286661337, maxn = 1e5+1;


void solve() {
    int n; cin >> n;
    int x1, y1, z1; cin >> x1 >> y1 >> z1;
    int x2, y2, z2; cin >> x2 >> y2 >> z2;

    int x, y, z, ans = INF2;
    ve<int> a;
    x1 += n, y1 += n, z1 += n;
    x2 += n, y2 += n, z2 += n;


    z2 = 2*n-z2;
    y2 = 2*n-y2;
    //
    x = 2*n - x1 + x2;
    y = abs(y1-y2);
    z = abs(z1 - z2);

    a = {x, y, z};
    sort(rall(a));

    ans = min(ans, a[0]);
//    ans = min(ans, a[0]+max(0ll, a[2]-(a[0]-a[1])));


    x = 2*n - x2 + x1;
    y = abs(y1-y2);
    z = abs(z1 - z2);

    a = {x, y, z};
    sort(rall(a));

    ans = min(ans, a[0]);
//    ans = min(ans, a[0]+max(0ll, a[2]-(a[0]-a[1])));
    //
    z2 = 2*n-z2;
    y2 = 2*n-y2;
```

```
    z2 = 2*n-z2;
    x2 = 2*n-x2;
    //
    x = abs(x1 - x2);
    y = 2*n - y1 + y2;
    z = abs(z1 - z2);

    a = {x, y, z};
    sort(rall(a));

    ans = min(ans, a[0]);
//    ans = min(ans, a[0]+max(0ll, a[2]-(a[0]-a[1])));

    x = abs(x1 - x2);
    y = 2*n - y2 + y1;
    z = abs(z1 - z2);

    a = {x, y, z};
    sort(rall(a));

    ans = min(ans, a[0]);
//    ans = min(ans, a[0]+max(0ll, a[2]-(a[0]-a[1])));
    //
    z2 = 2*n-z2;
    x2 = 2*n-x2;


    y2 = 2*n-y2;
    x2 = 2*n-x2;
    //
    x = abs(x1 - x2);
    y = abs(y2 - y1);
    z = 2*n - z2 + z1;

    a = {x, y, z};
    sort(rall(a));

    ans = min(ans, a[0]);
//    ans = min(ans, a[0]+max(0ll, a[2]-(a[0]-a[1])));

    x = abs(x1 - x2);
    y = abs(y2 - y1);
    z = 2*n - z1 + z2;

    a = {x, y, z};
    sort(rall(a));

    ans = min(ans, a[0]);
//    ans = min(ans, a[0]+max(0ll, a[2]-(a[0]-a[1])));
    //
```

```
    y2 = 2*n-y2;
    x2 = 2*n-x2;

    x = abs(x1 - x2);
    y = abs(y2 - y1);
    z = abs(z1-z2);

    a = {x, y, z};
    sort(rall(a));

//    ans = min(ans, a[0]+max(0ll, a[2]-(a[0]-a[1])));
    ans = min(ans, a[0]);

    cout << ans;

}


signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tt = 1;
//    cin >> tt;
    while (tt--) {
        solve();
    }
}
```

Task C

```
///@author: suuuiii
//#pragma GCC target("avx2,fma")
//#pragma GCC optimize("Ofast")
//#pragma GCC optimize("O3")

#include <bits/stdc++.h>
#include <ext/pb_ds/assoc_container.hpp>

#define int128 __int128
#define int long long
#define ll long long
#define ld long double
#define ve vector
#define all(a) (a).begin(), (a).end()
#define rall(a) (a).rbegin(), (a).rend()
#define pb push_back
#define eb emplace_back
#define INF1 INT32_MAX
#define INF2 INT64_MAX
#define sz(x) (int)(x).size()


using namespace std;
```

```
using namespace __gnu_pbds;

random_device rd;
mt19937 rnd(rd());

template<typename key, typename cmp = less_equal<>>
using pbds = tree<key, null_type, cmp, rb_tree_tag,
    tree_order_statistics_node_update>;

const int mod = 2286661337, maxn = 1e5+1;

int bp(int a, int n) {
    int res = 1;
    while (n) {
        if (n&1) --n, res = res*a%mod;
        else n >>= 1, a = a*a%mod;
    }
    return res;
}

void solve() {
    string t; cin >> t;
    int n; cin >> n;
    string s; cin >> s;

    if (t[0] == 'f') {
        int res = 0, p = 1;

        for (int i = 0; i < n; ++i) {
            res = (res + (s[i]-'0'+1)*p)%mod;
            p = (p*3)%mod;
        }

        cout << res;
    }
    else {
        int val; cin >> val;

        int res = 0, p = 1;

        int mn = bp(3, mod-2);

        for (int i = 0; i < n; ++i) {
            res = (res + (s[i]-'0'+1)*p)%mod;
            if (i != n-1) p = (p*3)%mod;
        }

        if (res == val) {
            cout << "YES\n";
            return;
        }
        for (char i : s) {
            res -= (i-'0'+1);
```

```
            if (res < 0) res += mod;

            res *= mn;
            res %= mod;

            res = (res + p*(i-'0'+1)) % mod;

            if (res == val) {
                cout << "YES\n";
                return;
            }
        }
        cout << "NO\n";
    }
}


signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tt = 1;
//    cin >> tt;
    while (tt--) {
        solve();
    }
}
```

Task D

```
///@author: suuuiii
//#pragma GCC target("avx2,fma")
//#pragma GCC optimize("Ofast")
//#pragma GCC optimize("O3")

#include <bits/stdc++.h>
#include <ext/pb_ds/assoc_container.hpp>

#define int128 __int128
#define int long long
#define ll long long
#define ld long double
#define ve vector
#define all(a) (a).begin(), (a).end()
#define rall(a) (a).rbegin(), (a).rend()
#define pb push_back
#define eb emplace_back
#define INF1 INT32_MAX
#define INF2 INT64_MAX
#define sz(x) (int)(x).size()


using namespace std;
using namespace __gnu_pbds;
```

```
random_device rd;
mt19937 rnd(rd());

template<typename key, typename cmp = less_equal<>>
using pbds = tree<key, null_type, cmp, rb_tree_tag,
    tree_order_statistics_node_update>;

const int mod = 2286661337, maxn = 1e5+1;


void solve() {
    int n; cin >> n;


    for (int t = 0; t < n; ++t) {
        cout << "1 1" << endl;
        char c;
        for (int i = 0; i < n-1; ++i) {
            cin >> c;
            if (c == '>') {
                cout << "1 " << n << endl;
            }
            else cout << "1 1" << endl;
        }
        cin >> c;
    }
    cout << "!" << endl;
}


signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tt = 1;
//    cin >> tt;
    while (tt--) {
        solve();
    }
}
```

Task E

```
///@author: suuuiii
//#pragma GCC target("avx2,fma")
//#pragma GCC optimize("Ofast")
//#pragma GCC optimize("O3")

#include <bits/stdc++.h>
#include <ext/pb_ds/assoc_container.hpp>

#define int128 __int128
#define int long long
```

```
#define ll long long
#define ld long double
#define ve vector
#define all(a) (a).begin(), (a).end()
#define rall(a) (a).rbegin(), (a).rend()
#define pb push_back
#define eb emplace_back
#define INF1 INT32_MAX
#define INF2 INT64_MAX
#define sz(x) (int)(x).size()


using namespace std;
using namespace __gnu_pbds;

random_device rd;
mt19937 rnd(rd());

template<typename key, typename cmp = less_equal<>>
using pbds = tree<key, null_type, cmp, rb_tree_tag,
    tree_order_statistics_node_update>;

const int mod = 998244353, maxn = 1e5+1;

deque<int> g[maxn];

map<int, int > res;
int cnt[maxn];
int need=0, n;

int cur = -1;

void dfs(int x) {
    res[++cur] = x;
    if (cur >= 1e6) return;
    if (x == 1 && need == n) return;

    int c = g[x].front();
    g[x].pop_front();
    g[x].eb(c);

    if (cnt[x] == sz(g[x]) - 1) ++need, cnt[x] = sz(g[x]);
    else {
        if (cnt[x] == sz(g[x])) cnt[x] = 0, --need;
        else cnt[x]++;
    }

    dfs(c);
}

void solve() {
    int q; cin >> n >> q;
```

```
    for (int i = 1; i <= n; ++i) {
        int k; cin >> k;

        while (k--) {
            int x; cin >> x;
            g[i].eb(x);
        }
    }

    dfs(1);
    while (q--) {
        int t; cin >> t;
        t %= cur;
        cout << res[t] << ' ';
    }
}


signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tt = 1;
//    cin >> tt;
    while (tt--) {
        solve();
    }
}
```

Task F

```
///@author: suuuiii
//#pragma GCC target("avx2,fma")
//#pragma GCC optimize("Ofast")
//#pragma GCC optimize("O3")

#include <bits/stdc++.h>
#include <ext/pb_ds/assoc_container.hpp>

#define int128 __int128
#define int long long
#define ll long long
#define ld long double
#define ve vector
#define all(a) (a).begin(), (a).end()
#define rall(a) (a).rbegin(), (a).rend()
#define pb push_back
#define eb emplace_back
#define INF1 INT32_MAX
#define INF2 INT64_MAX
#define sz(x) (int)(x).size()


using namespace std;
```

```
using namespace __gnu_pbds;

random_device rd;
mt19937 rnd(rd());

template<typename key, typename cmp = less_equal<>>
using pbds = tree<key, null_type, cmp, rb_tree_tag,
    tree_order_statistics_node_update>;

const int mod = 2286661337, maxn = 1e5+1;

int a[50][50];
char t[50][50];

pair<int, int> p[50][50];
pair<int, int> pl[50][50];
int used[50][50];

ve<pair<int, int>> g[50][50];

int cnt = 1;
bool dfs(int x, int y) {
    if (used[x][y] == cnt) return 0;
    used[x][y] = cnt;

    for (auto[xp, yp] : g[x][y]) {
        if (p[xp][yp] == make_pair(-1ll, -1ll)) {
            p[xp][yp] = {x, y};
            p[x][y] = {xp, yp};
            return 1;
        }
    }
    for (auto[xp, yp] : g[x][y]) {
        if (dfs(p[xp][yp].first, p[xp][yp].second)) {
            p[xp][yp] = {x, y};
            p[x][y] = {xp, yp};
            return 1;
        }
    }
    return 0;
}

void solve() {
    int n, m; cin >> n >> m;

    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < m; ++j) {
            char c; cin >> c;
            a[i][j] = c-'0';

            t[i][j] = '.';
        }
    }
```

```
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < m; ++j) {
//              g[i][j].eb(i, m-j-1);
//              g[i][j].eb(n-i-1, j);

            if (j < m-1) {
                g[i][j].eb(i, j+1);
                g[i][j+1].eb(i, j);
            }
            if (i < n-1) {
                g[i][j].eb(i+1, j);
                g[i+1][j].eb(i, j);
            }
        }
    }

    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < m; ++j) {
//              shuffle(all(g[i][j]), rnd);
            p[i][j] = {-1, -1};
        }
    }

    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < m; ++j) {
            if (p[i][j] == make_pair(-1ll, -1ll)) {
                ++cnt;
                dfs(i, j);
            }
        }
    }

    int ans = 0;

    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < m; ++j) {
            if (t[i][j] == '.' && p[i][j] != make_pair(-1ll, -1ll)) {
                int x1 = i, y1 = j;
                auto[x2, y2] = p[i][j];

                if (x1 == x2) {
                    if (y1 > y2) swap(y2, y1);

                    t[x1][y1] = 'L', t[x2][y2] = 'R';
                    if (y1!=y2-1) swap(t[x1][y1], t[x2][y2]);
                }
                else {
                    if (x1 > x2) swap(x2, x1);

                    t[x1][y1] = 'T', t[x2][y2] = 'B';
                    if (x1!=x2-1) swap(t[x1][y1], t[x2][y2]);
```

```
                }
                ans += a[x1][y1]*a[x2][y2];
            }
        }
    }

    cout << ans << '\n';
    for (int i = 0; i <n; ++i) {
        for (int j = 0; j < m; ++j) cout << t[i][j];
        cout << '\n';
    }

}


signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tt = 1;
//    cin >> tt;
    while (tt--) {
        solve();
    }
}
```