Олимпиада СПбГУ
по информатике
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A	B	C	D	E	F	sum
100	100	40	75	20	91	426

Task A

```
#include <iostream>
#include <vector>

using namespace std;

#define int long long

const int INF = 1e9 + 17;

void solve()
{
    int n, a, b;
    cin >> a >> b >> n;

    vector <int> dp(n+1, 1);

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

    int ans=dp[n];
    if (n >= a) ans += dp[n-a]*(a-1);
    if (n >= b) ans += dp[n-b]*(b-1);

    cout << ans;

    return;
}
```

```
signed main()
{
    #ifdef LOCAL
        freopen("input.txt", "r", stdin);
        freopen("output.txt", "w", stdout);
    #endif

    int tests=1;

    #ifdef LOCAL
        cin >> tests;
    #endif

    for (int _=0; _<tests; _++)
    {
        solve();
        cout << '\n';
    }

    return 0;
}
```

Task B

```
#include <iostream>
#include <vector>

using namespace std;

#define int long long

const int INF = 1e18 + 17;

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

    vector <vector <int>> v;
    v.push_back({x2, y2, z2});
    v.push_back({x2-2*n, y2+n, z2+n});
    v.push_back({x2+2*n, y2-n, z2-n});
    v.push_back({x2+n, y2-2*n, z2+n});
    v.push_back({x2-n, y2+2*n, z2-n});
    v.push_back({x2+n, y2+n, z2-2*n});
    v.push_back({x2-n, y2-n, z2+2*n});

    int ans=INF;
    for (int i=0; i<7; i++)
    {
        ans = min(ans, max(abs(x1-v[i][0]), max(abs(y1-v[i][1]), abs(z1-v
    [i][2]))));
```

```
    }

    cout << ans;

    return;
}

signed main()
{
    #ifdef LOCAL
        freopen("input.txt", "r", stdin);
        freopen("output.txt", "w", stdout);
    #endif

    int tests=1;

    #ifdef LOCAL
        cin >> tests;
    #endif

    for (int _=0; _<tests; _++)
    {
        solve();
        cout << '\n';
    }

    return 0;
}
```

Task C

```
#include <iostream>
#include <vector>

using namespace std;

#define int long long

const int INF = 1e9 + 17;

void solve()
{
    string type, s, t; int k;
    cin >> type >> k >> s;
    if (type == "first")
    {
        cout << s;
        return;
    }
    cin >> t;

    s += s;
    for (int i=0; i<2*k; i++)
```

```
    {
        bool f = true;
        for (int j=0; j<k; j++)
            if (s[i+j] != t[j]) f = false;
        if (f) {cout << "YES"; return;}
    }
    cout << "NO";

    return;
}

signed main()
{
    #ifdef LOCAL
        freopen("input.txt", "r", stdin);
        freopen("output.txt", "w", stdout);
    #endif

    int tests=1;

    #ifdef LOCAL
        cin >> tests;
    #endif

    for (int _=0; _<tests; _++)
    {
        solve();
        cout << '\n';
    }

    return 0;
}
```

Task D

```
#include <iostream>
#include <vector>

using namespace std;

#define int long long

const int INF = 1e9 + 17;

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

    for (int i=0; i<n; i++)
    {
        int k=n-i-1;
        while (k > 0)
```

```
        {
            cout << 1 << ' ' << 1 << endl;
            cin >> c;
            if (c == '!') return;
            if (c == '<')
            {
                cout << 1 << ' ' << n << endl;
                cin >> c; if (c == '!') return;
                for (int j=0; j<n-1; j++) {cout << 1 << ' ' << 1 << endl;
     cin >> c;
                if (c == '!') return;}
            }
            k--;
        }
        cout << 1 << ' ' << i+2 << endl;
        cin >> c; if (c == '!') return;
        for (int j=0; j<i+1; j++) {cout << 1 << ' ' << 1 << endl; cin >>
    c;
        if (c == '!') return;}
    }

    return;
}

signed main()
{
    ios::sync_with_stdio(false);
    cout.tie(0);
    cin.tie(0);

    #ifdef LOCAL
        // freopen("input.txt", "r", stdin);
        // freopen("output.txt", "w", stdout);
    #endif

    int tests=1;

    #ifdef LOCAL
        // cin >> tests;
    #endif

    for (int _=0; _<tests; _++)
    {
        solve();
        cout << '\n';
    }

    return 0;
}
```

Task E

```
#include <iostream>
```

```
#include <vector>

using namespace std;

#define int long long

const int INF = 1e9 + 17;
int timer; int j;

vector <vector <int>> g;
vector <int> t;

int dfs(int v, int pr=0)
{
    timer++;
    if (timer == t[j]) {cout << v+1 << ' '; j++;}
    int r=0;
    for (int i=0; i<g[v].size(); i++)
    {
        int u = g[v][i]; if (u == -1) continue;
        if (u == pr) {
            g[v][i] = -1;
            break;
        }
        dfs(u, v);
        timer++;
        if (timer == t[j]) {cout << v+1 << ' '; j++;}
        r++;
    }
    return r;
}

vector <int> ans;

void dfs1(int v)
{
    ans.push_back(v);
    bool f = true;
    for (auto u : g[v])
    {
        if (u == -1 || v == 0) f = false;
        if (f || u == -1) continue;
        dfs1(u);
        ans.push_back(v);
    }
    for (auto u : g[v])
    {
        if (u == -1) break;
        dfs1(u);
        ans.push_back(v);
    }
    return;
}
```

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

    g.resize(n);
    int x, y;
    for (int i=0; i<n; i++)
    {
        cin >> x;
        for (int j=0; j<x; j++)
        {
            cin >> y; y--;
            g[i].push_back(y);
        }
    }

    t.resize(q);
    j=0;

    for (int i=0; i<q; i++) cin >> t[i];

    vector <int> ind(n, 0);

    timer = 0; int v = 0;
    while (j < q)
    {
        if (timer == t[j]) {cout << v+1 << ' '; j++;}
        int u = g[v][ind[v]];
        ind[v]++; ind[v] %= g[v].size();
        v = u;
        timer++;
    }

    return;
}

signed main()
{
    #ifdef LOCAL
        freopen("input.txt", "r", stdin);
        freopen("output.txt", "w", stdout);
    #endif

    int tests=1;

    #ifdef LOCAL
        cin >> tests;
    #endif

    for (int _=0; _<tests; _++)
    {
```

```
        solve();
        cout << '\n';
    }

    return 0;
}
```

Task F

```
#include <iostream>
#include <vector>
#include <algorithm>

using namespace std;

#define int long long

const int INF = 1e9 + 17;

void solve()
{
    int h, w;
    cin >> h >> w;

    vector <vector <int>> v(h, vector <int> (w));
    vector <pair <pair <int, pair <int, int>>, int>> e;
    vector <int> u(h*w);

    char c;
    for (int i=0; i<h; i++)
    {
        for (int j=0; j<w; j++)
        {
            cin >> c;
            v[i][j] = c - '0';
        }
    }

    for (int i=0; i<h; i++)
    {
        for (int j=0; j<w; j++)
        {
            e.push_back({{v[i][j]*v[i][(j+1)%w], {i*w+j, i*w+((j+1)%w)}},
 1});
            e.push_back({{v[i][j]*v[(i+1)%h][j], {i*w+j, ((i+1)%h)*w+j}},
 2});
        }
    }

    sort(e.rbegin(), e.rend());

    vector <vector <char>> ans(h, vector <char> (w, '.'));
    int ans1=0;
```

```
    for (auto [x, t] : e)
    {
        auto [k, p] = x;
        {
            auto [a, b] = p;
            if (!u[a] && !u[b])
            {
                if (t == 1) {ans[a/w][a%w] = 'L'; ans[b/w][b%w] = 'R';}
                if (t == 2) {ans[a/w][a%w] = 'T'; ans[b/w][b%w] = 'B';}
                ans1 += k;
                u[a] = 1;
                u[b] = 1;
            }
        }
    }

    cout << ans1 << '\n';
    for (auto i : ans)
    {
        for (auto j : i) cout << j;
        cout << '\n';
    }

    return;
}

signed main()
{
    #ifdef LOCAL
        freopen("input.txt", "r", stdin);
        freopen("output.txt", "w", stdout);
    #endif

    int tests=1;

    #ifdef LOCAL
        cin >> tests;
    #endif

    for (int _=0; _<tests; _++)
    {
        solve();
        cout << '\n';
    }

    return 0;
}
```