

Олимпиада СПбГУ
по информатике
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A	B	C	D	E	F	sum
30	100	100	35	20	91	376

Task A

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

#define int long long
using namespace std;
using ll = long long;
using ull = unsigned long long;
using ld = long double;
using ql = __int128_t;

//mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());

int a, b, n;
int ans = 0;

void rec(int deep, string &s) {
    if (deep == n) {
        int k1 = -1;
        for (int i = 0; i < n; i++) {
            if (s[i] == '1') {
                k1 = i;
                break;
            }
        }
        int k2 = -1;
        for (int i = n - 1; i >= 0; i--) {
            if (s[i] == '1') {
                k2 = i;
                break;
            }
        }
        if (k1 < k2)
            ans++;
    }
}
```

```

    }
    if (k1 == -1 && k2 == -1) return;
    if (k1 + (n - 1 - k2) + 1 != a && k1 + (n - 1 - k2) + 1 != b)
return;
    int l = k1;
    for (int i = k1 + 1; i <= k2; i++) {
        if (s[i] == '1') {
            if (i - l != a && i - l != b) return;
            l = i;
        }
    }
    ans++;
    return;
}
string k = s;
k[deep] = '0';
rec(deep + 1, k);
k[deep] = '1';
rec(deep + 1, k);
}

void solve() {
    cin >> a >> b >> n;
    string s;
    for (int i = 0; i < n; i++) s += '0';
    rec(0, s);
    cout << ans;
}

signed main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int tt = 1;
    //cin >> tt;
    while (tt--) solve();
}

```

Task B

```

#include <bits/stdc++.h>

#define int long long
using namespace std;
using ll = long long;
using ull = unsigned long long;
using ld = long double;
using ql = __int128_t;

//mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());

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

```

```

int x1, y1, z1;
cin >> x1 >> y1 >> z1;
int x2, y2, z2;
cin >> x2 >> y2 >> z2;
int ans = (abs(x1 - x2) + abs(y1 - y2) + abs(z1 - z2)) / 2;
// x
int xn = x1 - 2 * n, yn = y1 + n, zn = z1 + n;
ans = min(ans, (abs(xn - x2) + abs(yn - y2) + abs(zn - z2)) / 2);
xn = x1 + 2 * n, yn = y1 - n, zn = z1 - n;
ans = min(ans, (abs(xn - x2) + abs(yn - y2) + abs(zn - z2)) / 2);
// y
xn = x1 - n, yn = y1 + 2 * n, zn = z1 - n;
ans = min(ans, (abs(xn - x2) + abs(yn - y2) + abs(zn - z2)) / 2);
xn = x1 + n, yn = y1 - 2 * n, zn = z1 + n;
ans = min(ans, (abs(xn - x2) + abs(yn - y2) + abs(zn - z2)) / 2);
// z
xn = x1 - n, yn = y1 - n, zn = z1 + 2 * n;
ans = min(ans, (abs(xn - x2) + abs(yn - y2) + abs(zn - z2)) / 2);
xn = x1 + n, yn = y1 + n, zn = z1 - 2 * n;
ans = min(ans, (abs(xn - x2) + abs(yn - y2) + abs(zn - z2)) / 2);
cout << ans;
}

signed main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int tt = 1;
    //cin >> tt;
    while (tt--) solve();
}

```

Task C

```

#include <bits/stdc++.h>

#define int long long
using namespace std;
using ll = long long;
using ull = unsigned long long;
using ld = long double;
using ql = __int128_t;

const int p = 257, M = 1e9 + 7;

int add(int a, int b) {
    if (a + b >= M) return a + b - M;
    return a + b;
}

int sub(int a, int b) {
    if (a - b < 0) return a - b + M;
    return a - b;
}

```

```

int mul(int a, int b) {
    return ((1LL * a * b) % M);
}

void solve() {
    vector<int> st(100001);
    st[0] = 1;
    for (int i = 0; i < 100000; i++) {
        st[i + 1] = mul(st[i], p);
    }
    string type;
    cin >> type;
    int n;
    cin >> n;
    string s;
    cin >> s;
    if (type == "first") {
        int hash = 0;
        for (int i = 0; i < n; i++) {
            if (s[i] == '0') continue;
            hash = add(hash, st[n - i - 1]);
        }
        cout << hash;
    } else {
        int h;
        cin >> h;
        int hash = 0;
        for (int i = 0; i < n; i++) {
            if (s[i] == '0') continue;
            hash = add(hash, st[n - i - 1]);
        }
        if (hash == h) {
            cout << "YES";
            return;
        }
        for (int i = 0; i < n - 1; i++) {
            if (s[i] == '1') hash = sub(hash, st[n - 1]);
            hash = mul(hash, p);
            if (s[i] == '1') hash += 1;
            if (hash == h) {
                cout << "YES";
                return;
            }
        }
        cout << "NO";
    }
}
//379444967
signed main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int tt = 1;

```

```

    //cin >> tt;
    while (tt--) solve();
}

```

Task D

```

#include <bits/stdc++.h>

#define int long long
using namespace std;
using ll = long long;
using ull = unsigned long long;
using ld = long double;
using ql = __int128_t;

mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());

void ask(int a, int b) {
    cout << a << ' ' << b << endl;
    char c;
    cin >> c;
    if (c == '!') exit(0);
}

void solve() {
    int n;
    cin >> n;
    while (1) {
        int a = (int)rnd() % n + 1;
        int b = (int)rnd() % n + 1;
        ask(a, b);
    }
}

signed main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int tt = 1;
    //cin >> tt;
    while (tt--) solve();
}

```

Task E

```

#include <bits/stdc++.h>

#define int long long
using namespace std;
using ll = long long;
using ull = unsigned long long;
using ld = long double;
using ql = __int128_t;

```

```

//mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());

struct que {
    int t, idx;
};

void solve() {
    int n, q;
    cin >> n >> q;
    vector<vector<int>> g(n + 1);
    for (int i = 1; i <= n; i++) {
        int x;
        cin >> x;
        g[i].resize(x);
        for (int j = 0; j < x; j++) {
            int k;
            cin >> k;
            g[i][j] = k;
        }
    }
    vector<que> qq(q);
    for (int i = 0; i < q; i++) {
        int x;
        cin >> x;
        qq[i].t = x;
        qq[i].idx = i;
    }
    sort(qq.begin(), qq.end(), [](que c1, que c2) {
        return c1.t < c2.t;
    });
    vector<int> ans(q);
    int v = 1;
    int tt = 0;
    int it = 0;
    vector<int> sdvig(n + 1, 0);
    while (it < q) {
        if (qq[it].t == tt) {
            ans[qq[it].idx] = v;
            it++;
        }
        int now = v;
        v = g[v][sdvig[v] % (int)g[v].size()];
        sdvig[now]++;
        tt++;
    }
    for (auto i : ans) cout << i << ' ';
}

signed main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int tt = 1;
}

```

```

    //cin >> tt;
    while (tt--) solve();
}

```

Task F

```

#include <bits/stdc++.h>

#define int long long
using namespace std;
using ll = long long;
using ull = unsigned long long;
using ld = long double;
using ql = __int128_t;

//mt19937 rnd(chrono::steady_clock::now().time_since_epoch().count());

struct pos{
    int v, i, j;
};

void solve() {
    int h, w;
    cin >> h >> w;
    vector<vector<int>> d(h, vector<int>(w));
    vector<pos> k;
    for (int i = 0; i < h; i++) {
        string s;
        cin >> s;
        for (int j = 0; j < w; j++) {
            d[i][j] = s[j] - '0';
            k.push_back({d[i][j], i, j});
        }
    }
    sort(k.begin(), k.end(), [] (pos c1, pos c2) {
        return c1.v > c2.v;
    });
    vector<vector<char>> ans(h, vector<char>(w, '.'));
    int res = 0;
    for (auto &[v, i, j] : k) {
        if (ans[i][j] != '.') continue;
        int vb = 0, vt = 0, vl = 0, vr = 0;
        if (i == h - 1) {
            if (ans[0][j] == '.') vb = d[0][j];
        } else {
            if (ans[i + 1][j] == '.') vb = d[i + 1][j];
        }
        if (i == 0) {
            if (ans[h - 1][j] == '.') vt = d[h - 1][j];
        } else {
            if (ans[i - 1][j] == '.') vt = d[i - 1][j];
        }
        if (j == 0) {

```

```

        if (ans[i][w - 1] == '.') vl = d[i][w - 1];
    } else {
        if (ans[i][j - 1] == '.') vl = d[i][j - 1];
    }
    if (j == w - 1) {
        if (ans[i][0] == '.') vr = d[i][0];
    } else {
        if (ans[i][j + 1] == '.') vr = d[i][j + 1];
    }
    if (vb == 0 && vt == 0 && vl == 0 && vr == 0) continue;
    if (vb >= vt && vb >= vl && vb >= vr) {
        res += d[i][j] * vb;
        ans[i][j] = 'T';
        if (i == h - 1) {
            ans[0][j] = 'B';
        } else {
            ans[i + 1][j] = 'B';
        }
    }
    else if (vt >= vb && vt >= vl && vt >= vr) {
        res += d[i][j] * vt;
        ans[i][j] = 'B';
        if (i == 0) {
            ans[h - 1][j] = 'T';
        } else {
            ans[i - 1][j] = 'T';
        }
    }
    else if (vl >= vb && vl >= vt && vl >= vr) {
        res += d[i][j] * vl;
        ans[i][j] = 'R';
        if (j == 0) {
            ans[i][w - 1] = 'L';
        } else {
            ans[i][j - 1] = 'L';
        }
    }
    else {
        res += d[i][j] * vr;
        ans[i][j] = 'L';
        if (j == w - 1) {
            ans[i][0] = 'R';
        } else {
            ans[i][j + 1] = 'R';
        }
    }
}
cout << res << '\n';
for (auto &i : ans) {
    for (auto j : i) cout << j;
    cout << '\n';
}
}

```

```
signed main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int tt = 1;
    //cin >> tt;
    while (tt--) solve();
}
```