Олимпиада СПбГУ
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A	B	C	D	E	F	sum
100	75	100	100	20	49	444

Task A

```
#include <iostream>
#include <vector>
#include <math.h>
#include <algorithm>
#include <set>
#include <map>
#include <deque>
#include <bits/stdc++.h>

using namespace std;

#define double long double
#define int long long

signed main()
{
    //freopen("C:\\Users\\maria\\CLionProjects\\untitled\\27.txt", "r",
    stdin);

    int a, b, n;
    cin >> a >> b >> n;

    int ans = 0;

    if (a <= n) {
        for (int i = 1; i <= a; i++) {
            vector<int> dp(n + 1, 0);
            dp[i] = 1;
            for (int j = i + 1; j <= n; j++) {
```

```
                if (j - a >= 1) {
                    dp[j] += dp[j - a];
                }
                if (j - b >= 1) {
                    dp[j] += dp[j - b];
                }
            }

            int x = n - (a - i);
            ans += dp[x];
        }

    }
    if (b <= n) {
        for (int i = 1; i <= b; i++) {
            vector<int> dp(n + 1, 0);
            dp[i] = 1;
            for (int j = i + 1; j <= n; j++) {
                if (j - a >= 1) {
                    dp[j] += dp[j - a];
                }
                if (j - b >= 1) {
                    dp[j] += dp[j - b];
                }
            }

            int x = n - (b - i);
            ans += dp[x];
        }

    }

    cout << ans;

    return 0;

}
```

Task B

```
#include <iostream>
#include <vector>
#include <math.h>
#include <algorithm>
#include <set>
#include <map>
#include <deque>
#include <bits/stdc++.h>

using namespace std;

#define double long double
#define int long long
```

```
int len(int x1, int y1, int z1, int x2, int y2, int z2) {
    int cnt = 1e17;

    for (int a = 0; a <= abs(x1 - x2); a++) {
        int b = abs(x1 - x2) - a;

        int x = x1;
        int y = y1;
        int z = z1;

        if (x1 < x2) {
            x = x2;
            y -= a;
            z -= b;
        }
        else {
            x = x2;
            y += a;
            z += b;
        }

        int c = abs(y - y2);

        if (y < y2) {
            y = y2;
            z -= c;
        }
        else {
            y = y2;
            z += c;
        }

        if (z == z2) {
            cnt = min(cnt, a + b + c);
        }
    }

    return cnt;
}

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

    int x2, y2, z2;
    cin >> x2 >> y2 >> z2;

    int ANS = 1e17;
    ANS = len(x1, y1, z1, x2, y2, z2);
    for (int u = 0; u <= n; u++) {
        ANS = min(ANS, len(x1, y1, z1, n, -u, -(n - u)) + len(x2, y2, z2,
     -n, (n - u), u));
```

```
        ANS = min(ANS, len(x1, y1, z1, -n, u, (n - u)) + len(x2, y2, z2,
    n, -(n - u), -u));

        ANS = min(ANS, len(x1, y1, z1, -u, n, -(n - u)) + len(x2, y2, z2,
     (n - u), -n, u));
        ANS = min(ANS, len(x1, y1, z1, u, -n, (n - u)) + len(x2, y2, z2,
    -(n - u), n, -u));

        ANS = min(ANS, len(x1, y1, z1, -u, -(n - u), n) + len(x2, y2, z2,
     (n - u), u, -n));
        ANS = min(ANS, len(x1, y1, z1, u, (n - u), -n) + len(x2, y2, z2,
    -(n - u), -u, n));
    }

    cout << ANS;
}

signed main()
{
    //freopen("C:\\Users\\maria\\CLionProjects\\untitled\\27.txt", "r",
    stdin);

    int n;
    cin >> n;

    if (n <= 10) {
        solve(n);
        return 0;
    }

    int x1, y1, z1;
    cin >> x1 >> y1 >> z1;

    int x2, y2, z2;
    cin >> x2 >> y2 >> z2;

    int cnt = 1e17;

    for (int a = 0; a <= abs(x1 - x2); a++) {
        int b = abs(x1 - x2) - a;

        int x = x1;
        int y = y1;
        int z = z1;

        if (x1 < x2) {
            x = x2;
            y -= a;
            z -= b;
        }
        else {
            x = x2;
            y += a;
```

```
            z += b;
        }

        int c = abs(y - y2);

        if (y < y2) {
            y = y2;
            z -= c;
        }
        else {
            y = y2;
            z += c;
        }

        if (z == z2) {
            cnt = min(cnt, a + b + c);
        }
    }

    cout << cnt;

    return 0;

}
```

Task C

```
#include <iostream>
#include <vector>
#include <math.h>
#include <algorithm>
#include <set>
#include <map>
#include <deque>
#include <bits/stdc++.h>

using namespace std;

#define double long double
#define int long long

int m1 = 1e9 + 7;
int m2 = 1e8 + 42434343;
int p1 = 127;
int p2 = 149;

string bits(int x) {
    string a = "";
    for (int i = 0; i < 50; i++) {
        char c = (x % 2) + '0';
        x /= 2;
        a = c + a;
    }
```

```
    return a;
}

void solve1() {
    int n;
    cin >> n;

    string s;
    cin >> s;

    int hash1 = 0;
    for (int i = 0; i < n; i++) {
        hash1 *= p1;
        hash1 += (s[i] - '0');
        hash1 %= m1;
    }

    int hash2 = 0;
    for (int i = 0; i < n; i++) {
        hash2 *= p2;
        hash2 += (s[i] - '0');
        hash2 %= m2;
    }

    cout << bits(hash1) << bits(hash2) << endl;
}

pair<int, int> tint(string a) {
    int x1 = 0;
    for (int i = 0; i < 50; i++) {
        x1 *= 2;
        x1 += (a[i] - '0');
    }

    int x2 = 0;
    for (int i = 50; i < 100; i++) {
        x2 *= 2;
        x2 += (a[i] - '0');
    }

    return {x1, x2};
}

void solve2() {
    int n;
    cin >> n;

    string s;
    cin >> s;

    string a;
    cin >> a;
```

```
    auto it = tint(a);
    int h1 = it.first;
    int h2 = it.second;

    int P1 = 1;
    int P2 = 1;

    for (int i = 1; i < n; i++) {
        P1 *= p1;
        P1 %= m1;
        P2 *= p2;
        P2 %= m2;
    }

    int hash1 = 0;
    for (int i = 0; i < n; i++) {
        hash1 *= p1;
        hash1 += (s[i] - '0');
        hash1 %= m1;
    }

    int hash2 = 0;
    for (int i = 0; i < n; i++) {
        hash2 *= p2;
        hash2 += (s[i] - '0');
        hash2 %= m2;
    }

    if (h1 == hash1 and h2 == hash2) {
        cout << "YES";
        return;
    }

    for (int i = 0; i < n; i++) {
        int x = s[i] - '0';
        hash1 = ((hash1 - x * P1) % m1 + m1) % m1;
        hash1 *= p1;
        hash1 += x;
        hash1 %= m1;

        hash2 = ((hash2 - x * P2) % m2 + m2) % m2;
        hash2 *= p2;
        hash2 += x;
        hash2 %= m2;

        if (h1 == hash1 and h2 == hash2) {
            cout << "YES";
            return;
        }
    }

    cout << "NO";
}
```

```
signed main()
{
    //freopen("C:\\Users\\maria\\CLionProjects\\untitled\\27.txt", "r",
    stdin);

    string t;
    cin >> t;

    if (t == "first") {
        solve1();
    }
    else {
        solve2();
    }

    return 0;

}
```

Task D

```
#include <iostream>
#include <vector>
#include <math.h>
#include <algorithm>
#include <set>
#include <map>
#include <deque>
#include <bits/stdc++.h>

using namespace std;

#define double long double
#define int long long

signed main()
{
    //freopen("C:\\Users\\maria\\CLionProjects\\untitled\\27.txt", "r",
    stdin);

    int n;
    cin >> n;

    while(1) {
        int fl = -100;
        for (int i = 0; i < n; i++) {
            cout << "1 1" << endl;
            cout.flush();
            char c;
            cin >> c;
```

```
            if (c == '>' and i - fl > 3 and i + 1 < n) {
                cout << "1 " << n << endl;
                cout.flush();
                cin >> c;

                fl = i;
                i++;
            }

            if (c == '!') {
                return 0;
            }

        }
    }

    return 0;

}
```

Task E

```
#include <iostream>
#include <vector>
#include <math.h>
#include <algorithm>
#include <set>
#include <map>
#include <deque>
#include <bits/stdc++.h>

using namespace std;

#define double long double
//#define int long long

vector<deque<int>> g(1e5 + 5);
vector<int> path;

bool fl = 1;
void dfs(int v) {
    path.push_back(v);
    if (path.size() > 1e5 + 1) {
        fl = 0;
    }
    if (fl == 0) return;

    while (1) {
        int u = g[v][0];
        g[v].pop_front();
        g[v].push_back(u);
```

```
        dfs(u);
        if (fl == 0) {
            return;
        }
    }
}

signed main()
{
    //freopen("C:\\Users\\maria\\CLionProjects\\untitled\\27.txt", "r",
    stdin);

    int n, q;
    cin >> n >> q;

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

        for (int j = 0; j < x; j++) {
            int v;
            cin >> v;
            g[i].push_back(v);
        }
    }

    dfs(1);

    while (q--) {
        int t;
        cin >> t;

        cout << path[t] << " ";
    }

    return 0;

}
```

Task F

```
#include <iostream>
#include <vector>
#include <math.h>
#include <algorithm>
#include <set>
#include <map>
#include <deque>
#include <bits/stdc++.h>

using namespace std;
```

```
#define double long double
//#define int long long

vector<int> used;
vector<vector<int>> g(1000);
vector<int> kuhn(1e5, -1);

bool dfs(int v) {
    //if (used[v] != 0) return 0;

    used[v] = 1;

    for (auto u : g[v]) {
        if (used[u] == 1) continue;
        if (kuhn[u] == -1 or dfs(kuhn[u]) == 1) {
            kuhn[u] = v;
            return 1;
        }
    }
    return 0;
}

int f(int i, int j) {
    return i * 100 + j;
}

signed main()
{
    //freopen("C:\\Users\\maria\\CLionProjects\\untitled\\27.txt", "r",
    stdin);

    int n, m;
    cin >> n >> m;

    vector<vector<int>> a(n, vector<int> (m));
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < m; j++) {
            char c;
            cin >> c;

            a[i][j] = int(c - '0');
        }
    }

    int sum = 0;
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < m; j += 2) {
            sum += a[i][j] * a[i][j + 1];
        }
    }

    int sum1 = 0;
    for (int i = 0; i < n; i += 2) {
```

```
        for (int j = 0; j < m; j++) {
            sum1 += a[i][j] * a[i + 1][j];
        }
    }

    if (sum > sum1) {
        cout << sum << endl;
        for (int i = 0; i < n; i++) {
            for (int j = 0; j < m; j += 2) {
                cout << "LR";
            }
            cout << endl;
        }
    }

    else {
        cout << sum1 << endl;
        for (int i = 0; i < n; i += 2) {
            for (int j = 0; j < m; j++) {
                cout << "T";
            }
            cout << endl;
            for (int j = 0; j < m; j++) {
                cout << "B";
            }
            cout << endl;
        }
    }

    return 0;

}
```