Олимпиада СПбГУ
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A	B	C	D	E	F	sum
100	100	100	35	20	91	446

Task A

```
//#pragma GCC targret("avx2,bmi,bmi2")
#pragma GCC optimize("trapv")
#include <bits/stdc++.h>
using namespace std;
#define int __int128
#define fi first
#define se second
#define all(v) v.begin(), v.end()
#define rall(v) v.rbegin(), v.rend()
#define eb emplace_back
#define pb push_back
#define ll long long
#define ld long double
#define fi first
int mod = 1e9 + 7;
int inf = 1e18;
int t = inf * inf;
mt19937_64 rnd(rand());
int c[500][500] = {0};

int ways(int a, int b, int n) {
    int ans = 0;
    for (int i = 0; i * a <= n; i++) {
        for (int j = 0; j * b <= n; j++) {
            if (a * i + j * b == n) {
                ans += c[i + j][i];
            }
        }
    }
```

```
    return ans;
}
void solve() {
    c[0][0] = 1;
    for (int i = 1; i < 500; i++) {
        for (int j = 0; j < 500; j++) {
            if (c[i - 1][j] < t) {
                c[i][j] += c[i - 1][j];
            }
            if (j != 0 && c[i - 1][j - 1] < t) {
                c[i][j] += c[i - 1][j - 1];
            }
        }
    }
    signed a, b, n;
    cin >> a >> b >> n;
    int ans = 0;
    int ca = ways(a, b, n - a);
    int cb = ways(a, b, n - b);
    for (int i = 0; i < n; i++) {
        if (i - a + 1 < 0) {
            ans += ca;
        }
        if (i - b + 1 < 0) {
            ans += cb;
        }
    }
    ans += 2 * ways(a, b, n - a - b);
    ans += ways(a, b, n - 2 * a);
    ans += ways(a, b, n - 2 * b);
    if (a == n) {
        ans++;
    }
    if (b == n) {
        ans++;
    }
    cout << (((long long)(ans / t)) == 0 ? "" : to_string(((long long)(
    ans / t)))) << (((long long)(ans / inf)) == 0 ? "" : to_string(((long
    long)((ans % t) / inf)))) << ((long long)(ans % inf))  << '\n';
}

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

Task B

```cpp
#pragma GCC targret("avx2,bmi,bmi2")
//#pragma GCC optimize("trapv")
#include <bits/stdc++.h>
using namespace std;
//#define int long long
#define fi first
#define se second
#define all(v) v.begin(), v.end()
#define rall(v) v.rbegin(), v.rend()
#define eb emplace_back
#define pb push_back
#define ll long long
#define ld long double
#define fi first
int mod = 1e9 + 7;
int inf = 1000000000000000000;
mt19937_64 rnd(rand());
int c(int n, int k) {
    int ans = 1;
    for (int i = n - k + 1; i <= n; i++) {
        ans *= i;
    }
    for (int i = 1; i <= k; i++) {
        ans /= i;
    }
    return ans;
}
int ways(int a, int b, int n) {
    int ans = 0;
    for (int i = 0; i * a <= n; i++) {
        for (int j = 0; j * b <= n; j++) {
            if (a * i + j * b == n) {
                ans += c(i + j, i);
            }
        }
    }
    return ans;
}
int dst(int x, int y, int z, int a, int b, int c) {
    int dx = x - a, dy = y - b, dz = z - c;
    int ans = 0;
    if (dx >= 0) ans += dx;
    if (dy >= 0) ans += dy;
    if (dz >= 0) ans += dz;
    return ans;
}
void solve() {
    int n;
    cin >> n;
    int a, b, c, a1, b1, c1;
    cin >> a >> b >> c >> a1 >> b1 >> c1;
    int ans = dst(a, b, c, a1, b1, c1);
    for (int i = 0; i <= n; i++) {
```

```
        ans = min(ans, dst(a, b, c, n, -i, i - n) + dst(-n, n - i, i, a1,
     b1, c1));
        ans = min(ans, dst(a1, b1, c1, n, -i, i - n) + dst(-n, n - i, i,
    a, b, c));
        ans = min(ans, dst(a, b, c, i - n, n, -i) + dst(i, -n, n - i, a1,
     b1, c1));
        ans = min(ans, dst(a1, b1, c1, i - n, n, -i) + dst(i, -n, n - i,
    a, b, c));
        ans = min(ans, dst(a, b, c, i - n, -i, n) + dst(i, n - i, -n, a1,
     b1, c1));
        ans = min(ans, dst(a1, b1, c1, i - n, -i, n) + dst(i, n - i, -n,
    a, b, c));
    }
    cout << ans << '\n';
}

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

Task C

```
#pragma GCC targret("avx2,bmi,bmi2")
//#pragma GCC optimize("trapv")
#include <bits/stdc++.h>
using namespace std;
#define int long long
#define fi first
#define se second
#define all(v) v.begin(), v.end()
#define rall(v) v.rbegin(), v.rend()
#define eb emplace_back
#define pb push_back
#define ll long long
#define ld long double
#define fi first
int mod = 1e9 + 7;
mt19937_64 rnd(rand());
int b = 31;
int b1 = 41;
void solve() {
    string t;
    cin >> t;
    if (t[0] == 'f') {
        int n;
        cin >> n;
        cin >> t;
```

```
    int pw1 = 1, pw = 1;
    int h = 0, h1 = 0;
    for (int i = 0; i < n; i++) {
        if (t[i] == '1') {
            h += pw;
            h1 += pw1;
        }
        pw = pw * b % mod;
        pw1 = pw1 * b1 % mod;
        h %= mod;
        h1 %= mod;
    }
    string o = to_string(h);
    while (o.size() < 50) {
        o = "0" + o;
    }
    string tw = to_string(h1);
    while (tw.size() < 50) {
        tw = "0" + tw;
    }
    cout << o << tw << '\n';
} else {
    int n;
    cin >> n;
    string s;
    cin >> s >> t;
    int r = stoll(t.substr(0, 50));
    int r1 = stoll(t.substr(50, 50));
    int h = 0, h1 = 0;
    int pw = 1, pw1 = 1;
    for (int i = 0; i < n; i++) {
        if (s[i] == '1') {
            h += pw;
            h1 += pw1;
        }
        if (i != n - 1) {
            pw = pw * b % mod;
            pw1 = pw1 * b1 % mod;
        }
        h %= mod;
        h1 %= mod;
    }
    if (r1 == h1 && r == h) {
        cout << "YES\n";
        return;
    }
    for (int i = 0; i < 2 * n; i++) {
        if (s.back() == '1') {
            h -= pw;
            h1 -= pw1;
            h += mod;
            h %= mod;
            h1 += mod;
```

```
                h1 %= mod;
            }
            s = s.substr(n - 1, 1) + s;
            h = h * b % mod;
            h += (s[0] - '0');
            h1 = h1 * b1 % mod;
            h1 += (s[0] - '0');
            if (r1 == h1 && r == h) {
                cout << "YES\n";
                return;
            }
            s.pop_back();
        }

        cout << "NO\n";
    }
}

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

Task D

```
//#pragma GCC targret("avx2,bmi,bmi2")
//#pragma GCC optimize("trapv")
#include <bits/stdc++.h>
using namespace std;
#define int long long
#define fi first
#define se second
#define all(v) v.begin(), v.end()
#define rall(v) v.rbegin(), v.rend()
#define eb emplace_back
#define pb push_back
#define ll long long
#define ld long double
#define fi first
int mod = 1e9 + 7;
int inf = 1e18;
mt19937_64 rnd(rand());
void solve() {
    int n;
    cin >> n;
    while (true) {
        int i = rnd() % n + 1, j = rnd() % n + 1;
        cout << i << " " << j << endl;
```

```
        char t;
        cin >> t;
        if (t == '!') {
            return;
        }
    }
}

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

Task E

```
//#pragma GCC targret("avx2,bmi,bmi2")
#pragma GCC optimize("trapv")
#include <bits/stdc++.h>
using namespace std;
#define int long long
#define fi first
#define se second
#define all(v) v.begin(), v.end()
#define rall(v) v.rbegin(), v.rend()
#define eb emplace_back
#define pb push_back
#define ll long long
#define ld long double
#define fi first
int mod = 1e9 + 7;
int inf = 1e18;
mt19937_64 rnd(rand());
vector<int> cyc;
vector<int> p;
vector<deque<int>> gr;
void dfs(int i, int pr = -1) {
    cyc[i] = 1;
    for (auto u : gr[i]) {
        if (u != pr) {
            dfs(u);
            cyc[i] += cyc[u] + 1;
        }
    }
}
void solve() {
    int n, q;
    cin >> n >> q;
    gr.assign(n, {});
```

```
cyc.assign(n, 0);
p.assign(n, -1);
for (int i = 0; i < n; i++) {
    int k;
    cin >> k;
    gr[i].assign(k, 0);
    for (auto& j : gr[i]) {
        cin >> j;
        j--;
    }
}
deque<int> t(q);
for (auto& i : t) cin >> i;
int pos = 0;
int cnt = 0;
int tim = 0;
for (int i = 0; !t.empty() && cnt < n - 1; i++) {
    if (t.front() == i) {
        cout << pos + 1 << '\n';
        t.pop_front();
    }
    if (gr[pos].back() == p[pos]) {
        cnt--;
    }
    gr[pos].push_back(gr[pos].front());
    if (gr[pos].back() == p[pos]) {
        cnt++;
    }
    gr[pos].pop_front();
    if (p[gr[pos].back()] == -1) {
        p[gr[pos].back()] = pos;
    }
    pos = gr[pos].back();
    tim++;
}
if (t.empty()) {
    return;
}
dfs(0);
vector<int> order;
pos = 0;
cyc[0]--;
for (int i = 0; i < cyc[0]; i++) {
    order.eb(pos);
    gr[pos].push_back(gr[pos].front());
    gr[pos].pop_front();
    pos = gr[pos].back();
}
while (!t.empty()) {
    int k = (t.front() - tim) / cyc[0];
    tim += k * cyc[0];
    cout << order[t.front() - tim] << '\n';
    t.pop_back();
```

```
    }
}

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

Task F

```
#pragma GCC targret("avx2,bmi,bmi2")
#pragma GCC optimize("trapv")
#include <bits/stdc++.h>
using namespace std;
#define int long long
#define fi first
#define se second
#define all(v) v.begin(), v.end()
#define rall(v) v.rbegin(), v.rend()
#define eb emplace_back
#define pb push_back
#define ll long long
#define ld long double
#define fi first
int mod = 1e9 + 7;
int inf = 1000000000000000000;
mt19937_64 rnd(rand());

void solve() {
    int w, h;
    cin >> w >> h;
    vector<vector<int>> a(w, vector<int> (h));
    for (auto& i : a) {
        for (auto& j : i) {
            char t;
            cin >> t;
            j = t - '0';
        }
    }
    vector<vector<int>> t;
    vector<vector<char>> ans(w, vector<char> (h, '.'));
    for (int i = 0; i < w; i++) {
        for (int j = 0; j < h; j++) {
            for (int di = 0; di <= 1; di++) {
                for (int dj = 0; dj <= 1; dj++) {
                    if (di + dj == 1) {
                        t.push_back({a[i][j] * a[(i + di) % w][(j + dj) %
     h], i, j, di, dj});
```

```
                    }
                }
            }
        }
    }
    sort(rall(t));
    int ta = 0;
    for (auto i : t) {
        if (ans[i[1]][i[2]] == '.' && ans[(i[1] + i[3]) % w][(i[2] + i
    [4]) % h] == '.') {
            ta += i[0];
            if (i[3] == 1) {
                ans[i[1]][i[2]] = 'T';
                ans[(i[1] + i[3]) % w][(i[2] + i[4]) % h] = 'B';
            } else {
                ans[i[1]][i[2]] = 'L';
                ans[(i[1] + i[3]) % w][(i[2] + i[4]) % h] = 'R';
            }
        }
    }
    cout << ta << '\n';
    for (auto i : ans) {
        for (auto j : i) {
            cout << j;
        }
        cout << '\n';
    }
}

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