

Олимпиада СПбГУ по информатике 2022/23 учебного года

A	B	C	D	E	F	Sum
100	100	90	60	32	65	447

Task A ()

```
// F
#pragma GCC optimize("Ofast,unroll-loops")
// #pragma GCC target("avx2,popcnt,bmi")
#include "bits/stdc++.h"

// ya gey
using namespace std;

typedef long long ll;
typedef long double ld;
// typedef __int128_t fbl;

#define MOD 11(998244353)
#define INF 11(1e18)
#define SIZE 100500

#define pb push_back
#define ppb pop_back
#define f first
#define s second

#define all(x) x.begin(), x.end()
#define vout(x) for (auto u : x) cout << u << ' ';
#define rndm drist(rng)

#define loop(i, n) for (ll i = 0; i < n; i++)
#define loopone(i, n) for (ll i = 1; i <= n; i++)
#define loopb(i, n) for (ll i = n - 1; i >= 0; i--)
#define loopbone(i, n) for (ll i = n; i > 0; i--)
#define looptr(u, g, ind) for (auto u : g[ind]) if (u != ind)
#define salo(x, comp) sort(x.begin(), x.end(), comp);

mt19937_64 rng(time(0));
uniform_int_distribution<ll> drist;

ll n, m, k, i, j, x, y, z, w;
string str, trash;
char chr;
ll sussy_baka;

//-----///

ll ans[SIZE];

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

#ifdef DEBUG
    freopen("test.txt", "r", stdin);
#endif

    vector<ll> val;
```

```

loop (i, 6) {
    cin >> x;
    vector<ll> nw;
    loop (j, x-1) nw.pb(val[j]);
    nw.pb(i+1);
    for (ll j = x-1; j < val.size(); j++) nw.pb(val[j]);
    val = nw;
}

```

```

loop (i, 6) ans[val[i]] = i+1;
loopone (i, 6) cout << ans[i] << '␣';

return 0;
}

```

Task B ()

```
// F
#pragma GCC optimize("Ofast,unroll-loops")
// #pragma GCC target("avx2,popcnt,bmi")
#include "bits/stdc++.h"

// ya gey
using namespace std;

typedef long long ll;
typedef long double ld;
// typedef __int128_t fbl;

#define MOD 11(998244353)
#define INF 11(1e18)
#define SIZE 100500

#define pb push_back
#define ppb pop_back
#define f first
#define s second

#define all(x) x.begin(), x.end()
#define vout(x) for (auto u : x) cout << u << '\n';
#define rndm drist(rng)

#define loop(i, n) for (ll i = 0; i < n; i++)
#define loopone(i, n) for (ll i = 1; i <= n; i++)
#define loopb(i, n) for (ll i = n - 1; i >= 0; i--)
#define loopbone(i, n) for (ll i = n; i > 0; i--)
#define looptr(u, g, ind) for (auto u : g[ind]) if (u != ind)
#define salo(x, comp) sort(x.begin(), x.end(), comp);

mt19937_64 rng(time(0));
uniform_int_distribution<ll> drist;

ll n, m, k, i, j, x, y, z, w;
string str, trash;
char chr;
ll sussy_baka;

//-----//

ll ans[SIZE];

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

#ifdef DEBUG
    freopen("test.txt", "r", stdin);
#endif

    cin >> str;

    if (str == "first") {
        cin >> n;
        ll ans = 0;
        loop (i, n) {
            cin >> x;
            ans += x;
        }
        cout << ans * 10000;
    } else {
        cin >> n;
        ll val = 0;
        ll ans = 0;
        loop (i, n) {
            cin >> x;
            val = x/10000;
            ans += x%10000;
        }
    }
}
```

```
        }  
        cout << ans + val;  
    }  
    return 0;  
}
```

Task C ()

```
// F
#pragma GCC optimize("Ofast,unroll-loops")
// #pragma GCC target("avx2,popcnt,bmi")
#include "bits/stdc++.h"

// ya gey
using namespace std;

typedef long long ll;
typedef long double ld;
// typedef __int128_t fbl;

#define MOD 11(998244353)
#define INF 11(1e18)
#define SIZE 100500

#define pb push_back
#define ppb pop_back
#define f first
#define s second

#define all(x) x.begin(), x.end()
#define vout(x) for (auto u : x) cout << u << ' ';
#define rndm drist(rng)

#define loop(i, n) for (ll i = 0; i < n; i++)
#define loopone(i, n) for (ll i = 1; i <= n; i++)
#define loopb(i, n) for (ll i = n - 1; i >= 0; i--)
#define loopbone(i, n) for (ll i = n; i > 0; i--)
#define looptr(u, g, ind) for (auto u : g[ind]) if (u != ind)
#define salo(x, comp) sort(x.begin(), x.end(), comp);

mt19937_64 rng(time(0));
uniform_int_distribution<ll> drist;

ll n, m, k, i, j, x, y, z, w;
string str, trash;
char chr;
ll sussy_baka;

//-----//

ll ans[20][20];

struct sq{
    ll x, y, ind;
    sq(){}
    sq(ll x, ll y, ll ind): x(x), y(y), ind(ind){}
};

vector<sq> val;

ll mapa[21][21];
bool was[21][21];

vector<pair<ll, ll>> go = {{0, 1}, {1, 0}, {-1, 0}, {0, -1}};

struct field{
    ll maxx = -INF, minx = INF, maxy = -INF, miny = INF;
    ll cnt = 0;
    field(ll x, ll y): maxx(x), minx(x), maxy(y), miny(y) {}
};

field dfs(ll x, ll y, ll type) {
    field ans(x, y);
    ans.cnt = 1;
    was[x][y] = 1;
    for (auto u : go) {
        if (!was[u.f + x][u.s + y] and mapa[u.f + x][u.s + y] == type) {
            field got = dfs(u.f + x, u.s + y, type);
            ans.cnt += got.cnt;
        }
    }
}
```

```

        ans.maxx = max(ans.maxx, got.maxx);
        ans.maxy = max(ans.maxy, got.maxy);
        ans.minx = min(ans.minx, got.minx);
        ans.miny = min(ans.miny, got.miny);
    }
}
return ans;
}

void solve(ll x, ll y, ll _x, ll _y) {

    memset(mapa, 0, sizeof mapa);
    memset(was, 1, sizeof was);

    loopone (i, val[0].x)
    loopone (j, val[0].y) was[i][j] = 0;

    loop (i, val[1].x)
    loop (j, val[1].y) mapa[i+x][j+y] = 1;

    ll gx = 0;
    ll gy = 0;

    if (_x != -1)
    loop (i, val[2].x)
        loop (j, val[2].y) {
            if (mapa[i+_x][j+_y] == 1) return;
            if (was[i+_x-1][j+_y] or mapa[i+_x-1][j+_y] or was[i+_x+1][j+_y] or mapa[i+_x+1][j+_y]
                ) gx = 1;
            if (was[i+_x][j+_y-1] or mapa[i+_x][j+_y-1] or was[i+_x][j+_y+1] or mapa[i+_x][j+_y
                +1]) gy = 1;
        }

    if (not ((gx and gy) or _x == -1)) return;

    if (_x != -1)
    loop (i, val[2].x)
        loop (j, val[2].y) {
            mapa[i+_x][j+_y] = 1;
        }

    vector<field> twos;

    loopone (i, val[0].x)
    loopone (j, val[0].y) {
        if (!was[i][j] and mapa[i][j] == 0) {
            twos.pb(dfs(i, j, 0));
        }
    }

    for (auto u : twos) {
        if ((u.maxx - u.minx + 1) * (u.maxy - u.miny + 1)
            == u.cnt) {
            ans[(u.maxx - u.minx + 1)][(u.maxy - u.miny + 1)] = 1;
            ans[(u.maxy - u.miny + 1)][(u.maxx - u.minx + 1)] = 1;
            if ((u.maxx - u.minx + 1) == 1 and (u.maxy - u.miny + 1) == 8) {
                //loopone (i, val[0].x) { cout << "\n";
                //    loopone (j, val[0].y) cout << mapa[i][j];
                //}
                //cout << x << ' ' << y << ' ' << _x << ' ' << _y << ' ' << val[1].x << ' ' << val
                [1].y << '\n';
                //cout << "\n—————\n";
            }
        }
    }
}

}

int main() {

```

```

ios::sync_with_stdio(0);
cin.tie(0);
cout.tie(0);

#ifdef DEBUG
    freopen("test.txt", "r", stdin);
#endif

cin >> x >> y;
val.pb(sq(x, y, 0));
cin >> x >> y;
val.pb(sq(x, y, 1));
cin >> x >> y;
val.pb(sq(x, y, 2));

for (auto u : val) {
    ans[u.x][u.y] = 1;
    ans[u.y][u.x] = 1;
}

loop (sussy_baka, 6) {
    loop (mask, 8) {

        loop (num, 3)
            if (val[num].x < val[num].y != bool(mask & (1<<num)))
                swap(val[num].x, val[num].y);

        for (auto x : {1ll, val[0].x - val[1].x + 1})
            for (auto y: {1ll, val[0].y - val[1].y + 1}) {

                loopone (_x, val[0].x - val[2].x + 1)
                loopone (_y, val[0].y - val[2].y + 1)
                if (x > 0 and y > 0 and _x > 0 and _y > 0 and y <= val[0].y - val[1].y + 1 and
                    x <= val[0].x - val[1].x + 1)
                    solve(x, y, _x, _y);

                if (x > 0 and y > 0 and y <= val[0].y - val[1].y + 1 and x <= val[0].x - val
                    [1].x + 1) solve(x, y, -1, INF);
            }

        }

        next_permutation(all(val), [](sq a, sq b){return a.ind < b.ind;});
    }

    for (ll i = 1; i < 10; i++) for (ll j = i; j < 10; j++) if (ans[i][j])
        cout << i << ' ' << j << '\n';

    return 0;
}

```

Task D ()

```
// F
#pragma GCC optimize("Ofast,unroll-loops")
// #pragma GCC target("avx2,popcnt,bmi")
#include "bits/stdc++.h"

// ya gey
using namespace std;

typedef long long ll;
typedef long double ld;
// typedef __int128_t fbl;

#define MOD 11(998244353)
#define INF 11(1e18)
#define SIZE 100500

#define pb push_back
#define ppb pop_back
#define f first
#define s second

#define all(x) x.begin(), x.end()
#define vout(x) for (auto u : x) cout << u << ' ';
#define rndm drist(rng)

#define loop(i, n) for (ll i = 0; i < n; i++)
#define loopone(i, n) for (ll i = 1; i <= n; i++)
#define loopb(i, n) for (ll i = n - 1; i >= 0; i--)
#define loopbone(i, n) for (ll i = n; i > 0; i--)
#define looptr(u, g, ind) for (auto u : g[ind]) if (u != ind)
#define salo(x, comp) sort(x.begin(), x.end(), comp);

mt19937_64 rng(time(0));
uniform_int_distribution<ll> drist;

ll n, m, k, i, j, x, y, z, w;
string str, trash;
char chr;
ll sussy_baka;

//-----//

ll din[200][200][200];
ll go[200][200][200];
bool was[200][200][200];

ll basex, basey, basez;

ll d(ll x, ll y, ll z) {
    if (x+y+z == 0) return 0;
    if (was[x][y][z]) return din[x][y][z];
    was[x][y][z] = 1;

    if (x % 2 and !d(basex*2, y, z)) din[x][y][z] = 1, go[x][y][z] = 1;
    if (y % 2 and !d(x, basey*2, z)) din[x][y][z] = 1, go[x][y][z] = 2;
    if (z % 2 and !d(x, y, basez*2)) din[x][y][z] = 1, go[x][y][z] = 3;

    loopone(i, x/2)
        if (!d(x-i*2, y, z)) din[x][y][z] = 1, go[x][y][z] = 1 + 10 * i;

    loopone(i, y/2)
        if (!d(x, y-i*2, z)) din[x][y][z] = 1, go[x][y][z] = 2 + 10 * i;

    loopone(i, z/2)
        if (!d(x, y, z-i*2)) din[x][y][z] = 1, go[x][y][z] = 3 + 10 * i;

    return din[x][y][z];
}
```



```

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

#ifdef DEBUG
    //freopen("test.txt", "r", stdin);
#endif

    cin >> n;

    if (n >= 1) {
        cin >> x;
        basex = x;
        x *= 2;
        x += 1;
    }

    if (n >= 2) {
        cin >> y;
        basey = y;
        y *= 2;
        y += 1;
    }

    if (n >= 3) {
        cin >> z;
        basez = z;
        z *= 2;
        z += 1;
    }

    loop (i, n-3) cin >> x;

    while (1) {

        if (!d(x, y, z)) {cout << -1 << '\n' << -1 << endl; break;}

        pair<ll, ll> vl = {go[x][y][z] % 10, go[x][y][z] / 10};

        cout << go[x][y][z] % 10 << '\n' << go[x][y][z] / 10 << endl;

        if (vl.f == 1) {
            if (vl.s == 0) x = basex * 2;
            x -= vl.s*2;
        }

        if (vl.f == 2) {
            if (vl.s == 0) y = basey * 2;
            y -= vl.s*2;
        }

        if (vl.f == 3) {
            if (vl.s == 0) z = basez * 2;
            z -= vl.s*2;
        }

        cin >> m >> k;

        if (m == -1) break;

        vl = {m, k};

        if (vl.f == 1) {
            if (vl.s == 0) x = basex * 2;
            x -= vl.s*2;
        }

        if (vl.f == 2) {

```

```

        if (v1.s == 0) y = basey * 2;
        y -= v1.s*2;
    }

    if (v1.f == 3) {
        if (v1.s == 0) z = basez * 2;
        z -= v1.s*2;
    }
    //cout << x << ' ' << y << ' ' << z << '\n';
}

return 0;
}

```

Task E ()

```
// F
#pragma GCC optimize("Ofast,unroll-loops")
// #pragma GCC target("avx2,popcnt,bmi")
#include "bits/stdc++.h"

// ya gey
using namespace std;

typedef long long ll;
typedef long double ld;
// typedef __int128_t fbl;

#define MOD 11(998244353)
#define INF 11(1e18)
#define SIZE 100500

#define pb push_back
#define ppb pop_back
#define f first
#define s second

#define all(x) x.begin(), x.end()
#define vout(x) for (auto u : x) cout << u << ' ';
#define rndm drist(rng)

#define loop(i, n) for (ll i = 0; i < n; i++)
#define loopone(i, n) for (ll i = 1; i <= n; i++)
#define loopb(i, n) for (ll i = n - 1; i >= 0; i--)
#define loopbone(i, n) for (ll i = n; i > 0; i--)
#define looptr(u, g, ind) for (auto u : g[ind]) if (u != ind)
#define salo(x, comp) sort(x.begin(), x.end(), comp);

mt19937_64 rng(time(0));
uniform_int_distribution<ll> drist;

ll n, m, k, i, j, x, y, z, w;
string str, trash;
char chr;
ll sussy_baka;

//-----//

ll din[12][12];
bool was[12][12];

ll d(ll ind, ll lst) {
    if (ind == 10) return 1;
    if (was[ind][lst]) return din[ind][lst];
    was[ind][lst] = 1;
    for (ll i = lst; i <= 10; i++) {
        din[ind][lst] += d(ind+1, i);
    }
    return din[ind][lst];
}

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

#ifdef DEBUG
    freopen("test.txt", "r", stdin);
#endif

    cin >> n;

    cin >> str;

    if (str == "transmit") {
```

```

loop (i, n) {
    cin >> x;
    vector<ll> ans;
    ll val = 0;
    loop (i, 10) {

        while (d(i+1, val) < x) {
            x -= d(i+1, val);
            val++;
        }
        ans.pb(val);
    }
    sort(all(ans));
    for (auto u : ans) {
        loop (i, u) cout << "1";
        loop (i, 10-u) cout << "0";
        cout << '\n';
    }
    cout << '\n';
}
} else {
    loop (i, n) {
        vector<ll> cnts;
        loop (i, 10) {
            ll cnt = 0;
            loop (j, 10) {
                cin >> chr;
                cnt += chr == '1';
            }
            cnts.pb(cnt);
        }

        sort(all(cnts));

        ll ans = 0;
        ll ind = 0;
        ll lst = 0;

        for (auto u : cnts) {
            while (lst < u) ans += d(ind+1, lst), lst++;

            ind ++;
        }
        cout << ans+1 << '\n';
    }
}

return 0;
}

```

Task F ()

```
a = int(input())  
b = int(input())  
print(a + b)
```