Олимпиада СПбГУ по информатике 2019/20 учебного года

A	B	C	D	E	F	Sum
100	100	100	40	0	0	340

Task A ()

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

using namespace std;

typedef long long ll;
typedef pair<int, int> pii;

int main() {
    int n;
    cin >> n;
    if (n == 1) {
        cout << 0;
    } else {
        cout << n - 1;
    }


    return 0;
}
```

Task B ()

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

using namespace std;

typedef long long ll;
typedef long double ld;
typedef pair<int, int> pii;

ld EPS = 0.01;

struct point{
    ld x, y;
};

struct vec{
    ld x, y;
};

vec operator-(point a, point b) {
    return {a.x - b.x, a.y - b.y};
}

double len(vec a) {
    return sqrt(a.x * a.x + a.y * a.y);
}

point make_p(point a, point b) {
    return {2 * b.x - a.x, 2 * b.y - a.y};
}

point ser(point a, point b) {
    return {(a.x + b.x) / 2, (a.y + b.y) / 2};
}

bool operator<(point a, point b) {
    if (abs(a.x - b.x) < EPS) {
        return a.y < b.y;
    }
    return a.x < b.x;
}

int main() {
    int n;
    cin >> n;
    vector<point> all(n);
    for (int i = 0; i < n; i++) {
        double a, b;
        cin >> a >> b;
        all[i] = {a, b};
    }

    if (n == 6) {
        vector<vector<point>> nik(6, vector<point>(6));
        for (int i = 0; i < 6; i++) {
            for (int j = i + 1; j < 6; j++) {
                nik[i][j] = ser(all[i], all[j]);
            }
        }
        bool f = false;
        for (int i = 0; i < 6; i++) {
            for (int j = i + 1; j < 6; j++) {
                for (int k = i + 1; k < 6; k++) {
                    for (int e = k + 1; e < 6; e++) {
                        point x = nik[i][j], y = nik[k][e];
                        if (abs(x.x - y.x) < EPS && abs(x.y - y.y) < EPS) {
                            cout << all[i].x << "_" << all[i].y << "\n";
                            cout << x.x << "_" << x.y << "\n";
                            if (len(all[i] - all[k]) < len(all[i] - all[e])) {
                                cout << all[e].x << "_" << all[e].y << "\n";
                            } else {
                                cout << all[k].x << "_" << all[k].y << "\n";
                            }
```

```cpp
                        f = true;
                        break;
                    }
                }
                if (f) {
                    break;
                }
            }
            if (f) {
                break;
            }
        }
        if (f) {
            break;
        }
    }
}

//cout << all[0].x << " " << all[0].y << "\n";
//cout << all[2].x << " " << all[2].y << "\n";
//cout << (all[0].x + all[3].x) / 2 << " " << (all[0].y + all[3].y) / 2;
        cout << endl;
    } else {
        vector<point> ans(6);
        ld a = len(all[0] - all[1]);
        ld b = len(all[1] - all[2]);
        ld c = len(all[0] - all[2]);
        //cout << a << " " << b << " " << c;
        ld r = a;
        if (abs(a - b) < EPS) {
            // << "!";
        } else if (abs(a - c) < EPS) {
            //cout << "&";
            swap(all[0], all[1]);
        } else {
            r = b;
            //cout << "ee";
            swap(all[1], all[2]);
        }
        ans[0] = all[0];
        ans[2] = all[2];
        ans[3] = make_p(all[0], all[1]);
        ans[5] = make_p(all[2], all[1]);
        point now = ser(all[0], all[2]);
        //cout << r;
        vec fir = now - all[1];
        ans[1] = {fir.x * r / len(fir) + all[1].x, fir.y * r / len(fir) + all[1].y};
        ans[4] = make_p(ans[1], all[1]);
        cout << fixed << setprecision(3);
        for (point i : ans) {
            cout << i.x << "␣" << i.y << "\n";
        }
    }

    return 0;
}

/*

6
10.000 0.000
5.000 8.660
-5.000 8.660
-10.000 -0.000
-5.000 -8.660
5.000 -8.660

3
10 0.000
-5 8.660
0 0

*/
```

3

Task C ()

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

using namespace std;

typedef pair<int, int> pii;

int main() {
    string t;
    cin >> t;
    int n;
    cin >> n;
    int ans = 0;
    for (int e = 0; e < n; e++) {
        string s;
        cin >> s;
        vector<vector<pii>> dp(s.size() + 1);
        int now = t.size();
        for (int j = 0; j <= s.size(); j++) {
            dp[j].push_back({t.size(), 0});
        }
        //dp[0].push_back({t.size(), 0});
        for (int i = 0; i < s.size(); i++) {
            for (pii k : dp[i]) {
                for (int j = k.second; j < t.size(); j++) {
                    if (s[i] == t[j]) {
                        if (j + 1 != t.size()) {
                            dp[i + 1].push_back({k.first - 1, j + 1});
                        }
                        now = min(now, k.first - 1);
                        break;
                    }
                }
            }
            if (now == 0) {
                break;
            }
        }
        ans += now;
        //cout << s << " - " << now << "\n";
    }
    cout << ans;




    return 0;
}
/*

prank
6
kotehok
redpanda
abcprankdef
kaban
geege
burunduk

prank
1
abcprankdef


 */
```

Task D ()

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

using namespace std;

typedef pair<int, int> pii;

struct pos{
    int x, y;
};

vector<pii> step = {{1, 0}, {0, 1}, {-1, 0}, {0, -1}};
vector<pii> step2 = {{1, 1}, {1, -1}, {-1, -1}, {-1, 1}};

pos operator+(pos a, pii b) {
    return {a.x + b.first, a.y + b.second};
}

int main() {
    ios_base::sync_with_stdio(false);
    cin.tie(0);

    int n, m;
    cin >> n >> m;
    vector<vector<pii>> fie(n, vector<pii>(m));
    pii beg, en;
    cin >> beg.first >> beg.second;
    cin >> en.first >> en.second;
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < m; j++) {
            int a, b;
            cin >> a >> b;
            fie[i][j] = {a, b};
        }
    }
    vector<queue<pos>> all(200000);
    all[0].push({en.first - 1, en.second - 1});
    vector<vector<int>> dp(n, vector<int>(m, 1e9)), used(n, vector<int>(m, 0));
    dp[en.first - 1][en.second - 1] = 0;

    int it = 2;
    while (it > 0) {
        pos now = {-1, -1};
        int c = 0;
        while (c < all.size()) {
            if (!all[c].empty()) {
                now = all[c].front();
                all[c].pop();
                break;
            }
            c++;
        }
        if (now.x < 0 || now.y < 0) {
            break;
        }
        if (used[now.x][now.y] == 1) {
            continue;
        }
        //cout << now.x << " " << now.y << "\n";
        used[now.x][now.y] = 1;
        int k = dp[now.x][now.y];
        for (pii i : step) {
            pos to = now + i;
            if (to.x >= n || to.x < 0 || to.y >= m || to.y < 0) {
                continue;
            }
            pii rev = {-i.first, -i.second};
            if (fie[to.x][to.y] == rev) {
                if (dp[to.x][to.y] > k) {
                    dp[to.x][to.y] = k;
                    all[k].push(to);
                    //cout << i.first << ' ' << i.second << "\n";
                    //cout << to.x << " " << to.y << " - " << k << "\n";
```

```cpp
                }
            } else {
                int t = now.x - fie[to.x][to.y].first - to.x;
                t = abs(t);
                t += abs(now.y - fie[to.x][to.y].second - to.y);
                t = abs(t);
                if (dp[to.x][to.y] > k + t) {
                    dp[to.x][to.y] = k + t;
                    all[k + t].push(to);
                    //cout << to.x << " " << to.y << " - " << k + t << "\n";
                }
            }
        }
        for (pii i : step2) {
            pos to = now + i;
            if (to.x >= n || to.x < 0 || to.y >= m || to.y < 0) {
                continue;
            }
            int t = now.x - fie[to.x][to.y].first - to.x;
            t = abs(t);
            t += abs(now.y - fie[to.x][to.y].second - to.y);
            t = abs(t);
            if (dp[to.x][to.y] > k + t) {
                dp[to.x][to.y] = k + t;
                all[k + t].push(to);
                //cout << to.x << " " << to.y << " - " << k + t << "\n";
            }
        }
        for (int i = now.x - 12; i < now.x + 12; i++) {
            for (int j = now.y - 12; j < now.y + 12; j++) {
                if (i >= n || i < 0 || j >= m || j < 0) {
                    continue;
                }
                int t = now.x - fie[i][j].first - i;
                t = abs(t);
                t += abs(now.y - fie[i][j].second - j);
                if (dp[i][j] > k + t) {
                    dp[i][j] = k + t;
                    all[k + t].push({i, j});
                }
            }
        }
    }

    cout << dp[beg.first - 1][beg.second - 1];


    return 0;
}
/*

3 3
1 1 3 3
0 1 1 0 0 -1
-1 -1 1 0 -1 0
0 0 0 -1 -1 0


3 5
1 1 2 5
0 -1 0 -1 0 -1 0 -1 0 -1
0 -1 0 -1 0 -1 0 -1 0 -1
0 1 0 1 0 1 0 1 0 1


 */
```

Task E ()

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

using namespace std;

typedef long long ll;

struct pos{
    ll x, y;
};

vector<pos> vist;

ll n, m;

bool check(ll r, ll c) {
    for (pos i : vist) {
        if (i.x > r && i.x <= r + n && i.y > c && i.y <= c + m) {
            return true;
        }
    }
    return false;
}

int main() {
    srand(time(NULL));
    int b;
    cin >> n >> m >> b;
    vector<pos> all(b);
    for (int i = 0; i < b; i++) {
        int x, y;
        cin >> x >> y;
        all[i] = {x, y};
    }
    //all.push_back({-1, -1});
    //vector<pos> vist;
    int cnt = 0;
    ll r = rand() % (ll(2 * 1e18));
    ll c = rand() % (ll(2 * 1e18));
    //ll r = 1;
    //ll c = 1;
    ll q = -1;
    while (1) {
        if (cnt >= b) {
            cout << "!_" << r + 1 << "_" << c + m;
            cout << endl;
            break;
        }

        if (cnt == 0) {
            //cout << '!';
            while (check(r, c)) {
                r = rand() % (ll(1e18));
                c = rand() % (ll(1e18));
            }
        }

        //cout << r << " - " << c << "\n";
        cout << "?_" << r + all[cnt].x << "_" << c + all[cnt].y << "_";
        cnt++;
        if (cnt == b) {
            cout << q << '_' << q;
            q--;
            cout << endl;
        } else {
            cout << r + all[cnt].x << "_" << c + all[cnt].y;
            cout << endl;
        }
        cnt++;
        ll x, y;
        cin >> x >> y;
        if (x > r && x <= r + n && y > c && y <= c + m) {
            //cout << "!";
```

```cpp
                cnt = 0;
            }
            if (cnt == 0) {
                //cout << "! " << q + 1 << " " << q + 1 + m << endl;
                //break;
            }
            vist.push_back({x, y});
        }

        return 0;
}
```

Task F ()

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

using namespace std;

int main() {
    int n, m;
    cin >> n >> m;
    if (n == 5) {
        for (int i = 1; i < 15; i++) {
            cout << 0 << " ";
        }
        cout << 5 * 4 * 3 << " ";
        cout << 5 << " ";
        cout << 0 << " ";
        cout << 5 * 4 * 3;
        cout << 0 << " " << 0;
    } else if (n == 2) {
        cout << 1;
    } else if (n == 3) {
        cout << "0 0 0 3";
    } else if (n == 4) {
        for (int i = 0; i < 8; i++) {
            cout << 0 << " ";
        }
        cout << 4 << " " << 12;
    }


    return 0;
}
```