

Олимпиада СПбГУ по информатике 2019/20 учебного года

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

Task A ()

```
#define pb push_back
#define _CRT_SECURE_NO_WARNINGS

#include <iostream>
#include <cstdio>
#include <iomanip>

#include <algorithm>
#include <functional>
#include <climits>
#include <cmath>
#include <cassert>
#include <cctype>
#include <vector>
#include <set>
#include <map>
#include <queue>
#include <bitset>
#include <unordered_set>
#include <unordered_map>
#include <string>
#include <stack>

using namespace std;

#define int long long

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

const int N = 5e5 + 5;
const int INF = 1e18;
const int lim = 33;

signed main() {
    //freopen("input.txt", "r", stdin);

    int n;
    cin >> n;
    cout << n - 1 << endl;

    return 0;
}
```

Task B ()

```
#define _CRT_SECURE_NO_WARNINGS
#define pb push_back
#define mp make_pair
#include <iostream>
#include <climits>
#include <algorithm>
#include <iomanip>
#include <cmath>
#include <vector>
#include <map>
#include <string>
#include <stack>
#include <set>
#include <cstdio>
#include <cctype>
#include <queue>
#include <bitset>
#include <functional>
#include <cassert>
#include <unordered_map>

using namespace std;

#define int long long

typedef long long ll;
typedef unsigned long long ull;
typedef pair<ll, ll> pll;
typedef pair<int, int> pii;
typedef long double ld;
typedef double db;

const ll N = 1e5 + 20;
const ll INF = INT_MAX;

const ld eps = 1e-10;
const ld base = 0.0;

struct point {
    ld x, y;
    point(ld x = base, ld y = base) {
        this->x = x;
        this->y = y;
    }
};

const point pt_base = point( 0.0, 0.0 );
const point inf = point( -1e10, -1e10 );

bool is_equal(ld a, ld b) {
    return fabs(a - b) < eps;
}

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

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

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

ld operator^(point a, point b) {
    return a.x * b.x + a.y * b.y;
}

bool operator<(point a, point b) {
    if (is_equal(a.x, b.x)) return a.y > b.y;
    return a.x < b.x;
}

ld len(point a) {
```

```

        return sqrt(a.x * a.x + a.y * a.y);
    }

    bool operator==(point a, point b) {
        return is_equal(a.x, b.x) && is_equal(a.y, b.y);
    }

signed main() {
#ifdef ONLINE_JUDGE
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#else
#endif
    ios_base::sync_with_stdio(0);
    cin.tie(0); cout.tie(0);

    int n;
    cin >> n;
    vector<point> a(n);
    for (int i = 0; i < n; ++i) cin >> a[i].x >> a[i].y;
    sort(a.begin(), a.end());
    cout << fixed << setprecision(10);
    if (n == 6) {
        for (int i = 0; i < 3; ++i) cout << a[i].x << '␣' << a[i].y << endl;
    } else {
        point b[3];
        b[1] = (a[2] - a[0]);
        b[2] = (a[1] - a[0]);
        b[0] = (a[1] - a[0]) + (a[2] - a[0]);
        cout << a[0].x << '␣' << a[0].y << endl;
        cout << a[1].x << '␣' << a[1].y << endl;
        point add = point(b[2].x * 2, b[2].y * 2);
        cout << a[2].x + add.x << '␣' << a[2].y + add.y << endl;
        add = point(b[0].x * 2, b[0].y * 2);
        cout << a[0].x + add.x << '␣' << a[0].y + add.y << endl;
        add = point(b[1].x * 2, b[1].y * 2);
        cout << a[1].x + add.x << '␣' << a[1].y + add.y << endl;
        cout << a[2].x << '␣' << a[2].y << endl;
    }

    return 0;
}

```

Task C ()

```
#define pb push_back
#define _CRT_SECURE_NO_WARNINGS

#include <iostream>
#include <cstdio>
#include <iomanip>

#include <algorithm>
#include <functional>
#include <climits>
#include <cmath>
#include <cassert>
#include <cctype>
#include <vector>
#include <set>
#include <map>
#include <queue>
#include <bitset>
#include <unordered_set>
#include <unordered_map>
#include <string>
#include <stack>

using namespace std;

#define int long long

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

const int N = 5e5 + 5;
const int INF = 1e18;
const int lim = 33;
const ld eps = 1e-6;

bool is_equal(pair<ld, ld> a, pair<ld, ld> b) {
    return fabs(a.first - b.first) < eps && fabs(a.second - b.second) < eps;
}

signed main() {
    //freopen("input.txt", "r", stdin);

    string a;
    cin >> a;
    int t;
    cin >> t;
    int ans = 0;
    while(t--) {
        string b;
        cin >> b;
        int cur = a.size();
        for (int i = 0; i < b.size(); ++i) {
            int sz = 0;
            int cnt = 0;
            int j = i;
            for (; j < b.size(); ++j) {
                if (sz >= a.size()) break;
                if (b[j] == a[sz]) {
                    cnt++;
                    sz++;
                }
            }
            else {
                sz++;
                j--;
            }
        }
        if (cnt == j - i)
            cur = min(cur, (int)a.size() - cnt);
    }
    //cout << cur << endl;
```

```
        ans += cur;
    }
    cout << ans << endl;

    return 0;
}
```

Task D ()

```
#define pb push_back
#define _CRT_SECURE_NO_WARNINGS
#define mp make_pair
#include <iostream>
#include <cstdio>
#include <iomanip>

#include <algorithm>
#include <functional>
#include <climits>
#include <cmath>
#include <cassert>
#include <cctype>
#include <vector>
#include <set>
#include <map>
#include <queue>
#include <bitset>
#include <unordered_set>
#include <unordered_map>
#include <string>
#include <stack>

using namespace std;

#define int long long

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

const int N = 50 + 5;
const int INF = 1e18;
const int lim = 33;
const ld eps = 1e-6;

bool is_equal(pair<ld, ld> a, pair<ld, ld> b) {
    return fabs(a.first - b.first) < eps && fabs(a.second - b.second) < eps;
}

int a[N][N], b[N][N];
int dp[N][N];

int abss(int a) {
    if (a < 0) return a * (-1);
    return a;
}

int n, m;
pii f, s;

int dx[] = {0, 1, -1, 0, 0, 1, -1, 1, -1};
int dy[] = {0, 0, 0, 1, -1, 1, -1, -1, 1};

bool ok(int x, int y) {
    return x >= 1 && x <= n && y >= 1 && y <= m;
}

void dij(int f1, int f2) {
    priority_queue<pair<int, pii>, vector<pair<int, pii>>, greater<pair<int, pii>>> q;
    dp[f1][f2] = 0;
    q.push(mp(0, mp(f1, f2)));
    while (!q.empty()) {
        int d = q.top().first;
        int x = q.top().second.first;
        int y = q.top().second.second;
        q.pop();
        if (dp[x][y] != d) continue;
        for (int i = 0; i < 9; ++i) {
            for (int k1 = 1; k1 <= n; ++k1) {
                for (int k2 = 1; k2 <= m; ++k2) {
                    int nx = x + k1 * dx[i] + a[x][y];
                    int ny = y + k2 * dy[i] + b[x][y];
                    if (ok(nx, ny) && dp[nx][ny] > dp[x][y] + abss(k1 * dx[i]))
```

```

        + abss(k2 * dy[i])) {
            dp[nx][ny] = dp[x][y] + abss(k1 * dx[i]) + abss(k2
                * dy[i]);
            q.push(mp(dp[nx][ny], mp(nx,ny)));
            //cout << x << ' ' << y << ' ' << dp[x][y] << ' '
                << nx << ' ' << ny << ' ' << dp[nx][ny] <<
                endl;
        }
    }
}

signed main() {
    //freopen("input.txt", "r", stdin);

    for (int i = 0; i < N; ++i) {
        for (int j = 0; j < N; ++j) {
            dp[i][j] = 1e18;
        }
    }
    cin >> n >> m;
    cin >> f.first >> f.second >> s.first >> s.second;
    for (int i = 1; i <= n; ++i) {
        for (int j = 1; j <= m; ++j) {
            cin >> a[i][j] >> b[i][j];
        }
    }
    dij(f.first, f.second);
    cout << dp[s.first][s.second];
    return 0;
}

```

Task E ()

```
#define _CRT_SECURE_NO_WARNINGS
#define pb push_back
#define mp make_pair
#include <iostream>
#include <limits>
#include <algorithm>
#include <iomanip>
#include <cmath>
#include <vector>
#include <map>
#include <string>
#include <stack>
#include <set>
#include <cstdio>
#include <cctype>
#include <queue>
#include <bitset>
#include <functional>
#include <cassert>
#include <unordered_map>

using namespace std;

#define int long long

typedef long long ll;
typedef unsigned long long ull;
typedef pair<ll, ll> pll;
typedef pair<int, int> pii;
typedef long double ld;
typedef double db;

const ll N = 1e5 + 20;
const ll INF = INT_MAX;

pii ask(int x1, int y1, int x2, int y2) {
    cout << "? " << x1 << ' ' << y1 << ' ' << x2 << ' ' << y2 << endl;
    pii ans;
    cin >> ans.first >> ans.second;
    return ans;
}

signed main() {
#ifdef ONLINE_JUDGE
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#else
#endif
    ios_base::sync_with_stdio(0);
    cin.tie(0); cout.tie(0);

    int n, m;
    cin >> n >> m;
    int B;
    cin >> B;
    vector<pii> a(B);
    for (int i = 0; i < B; ++i) {
        cin >> a[i].first >> a[i].second;
    }
    sort(a.begin(), a.end());
    if (B == 1) {
        pii ans = ask(a[0].first, a[0].second, a[0].first + n, a[0].second + m);
        if (ans.first == a[0].first && ans.second == a[0].second) {
            cout << "! " << a[0].first + n << ' ' << a[0].second + m << endl;
            return 0;
        }
        if (ans.first == a[0].first + n && ans.second == a[0].second) {
            cout << "! " << a[0].first << ' ' << a[0].second << endl;
            return 0;
        }
        cout << "! " << a[0].first << ' ' << a[0].second << endl;
    }
}
```



```
    return 0;  
}
```

Task F ()