

Олимпиада СПбГУ по информатике 2019/20 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	100	23	523

Task A ()

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

using namespace std;

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

#define pb push_back
#define eb emplace_back
#define mp make_pair
#define fi first
#define se second
#define print(x) { for(auto xxxxx : (x)) cout << xxxxx << ' '; cout << '\n'; }
#define all(x) (x).begin() , (x).end()
#define rall(x) (x).rbegin() , (x).rend()

ll next(){ll x; cin >> x; return x;}

const int inf = 2e9 , maxn = 2e5;
const ll mod = 1e9 + 7 , inf = 2e18;

void solve(){
    int n; cin >> n;
    cout << n - 1;
}

signed main(){
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0); cout.precision(20);
    //freopen("input.txt" , "r" , stdin);

    for (int t = 1; t--;) solve();

    return 0;
}
/*

*/
```

Task B ()

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

using namespace std;

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

#define pb push_back
#define eb emplace_back
#define mp make_pair
#define fi first
#define se second
#define print(x) { for(auto xxxxx : (x)) cout << xxxxx << ' '; cout << '\n'; }
#define all(x) (x).begin() , (x).end()
#define rall(x) (x).rbegin() , (x).rend()

ll next(){ll x; cin >> x; return x;}

const int inf = 2e9 , maxn = 2e5;
const ll mod = 1e9 + 7 , inf = 2e18;
const ld eps = 1e-8;

struct Vector{
    ld x , y;

    Vector(){}
    Vector(ld x , ld y): x(x) , y(y) {}

    void rot(ld sin , ld cos){
        ld x1 = x , y1 = y;
        x = x1*cos - y1*sin;
        y = x1*sin + y1*cos;
    }

    ld dist(){
        return sqrt(x*x + y*y);
    }
};

istream &operator >>(istream &in , Vector &a){
    return in >> a.x >> a.y;
}

ostream &operator <<(ostream &out , const Vector &a){
    return out << a.x << ' ' << a.y;
}

Vector operator +(const Vector &a , const Vector &b){
    return Vector(a.x + b.x , a.y + b.y);
}

Vector operator -(const Vector &a){
    return Vector(-a.x , -a.y);
}

Vector operator -(const Vector &a , const Vector &b){
    return a + (-b);
}

Vector operator *(const Vector &a , const ld &b){
    return Vector(a.x*b , a.y*b);
}

Vector operator *(const ld &b , const Vector &a){
    return a*b;
}

Vector operator /(const Vector &a , const ld &b){
    return a * (1 / b);
}
```

```

}

Vector operator / (const ld &b , const Vector &a){
    return a/b;
}

ld CrossProduct(const Vector &a , const Vector &b){
    return a.x*b.y - a.y*b.x;
}

bool leftTurn(const Vector &a , const Vector &b , const Vector &c){
    return CrossProduct(b-a , c-b) > -eps;
}

void solve(){
    int n; cin >> n;
    vector <Vector> a(n);
    for (auto &x : a) cin >> x;

    if (n == 6){
        swap(a[0] , a[min_element(all(a) , [](const Vector &a , const Vector &b){return a.x < b.x
            || (a.x == b.x && a.y < b.y);}) - a.begin()]);
        sort(1 + all(a) , [a](const Vector &b , const Vector &c){
            return leftTurn(a[0] , b , c);
        });

        //cout << (a[0] - a[1]).dist() << '\n';

        cout << a[0] << '\n' << a[2] << '\n' << a[4] << '\n';
    } else {
        swap(a[0] , a[min_element(all(a) , [](const Vector &a , const Vector &b){return a.x < b.x
            || (a.x == b.x && a.y < b.y);}) - a.begin()]);
        sort(1 + all(a) , [a](const Vector &b , const Vector &c){
            return leftTurn(a[0] , b , c);
        });

        ld A = (a[0] - a[1]).dist()/sqrt(ld(3));
        //cout << (a[0] - a[1]).dist() << '\n';
        //cout << A << '\n';

        ld Cos = sqrt(ld(3)) / ld(2) , Sin = ld(1) / ld(2);
        //cout << Cos << ' ' << Sin << '\n';
        for (int i = 0; i < 3; i++){
            Vector V1 = a[i] , V2 = a[(i + 1) % 3];
            Vector V = V2 - V1;
            V = V * (A / (a[0] - a[1]).dist());
            V.rot(-Sin , Cos);
            //cout << V << '\n';
            a.pb(V + V1);
        }
        //cout << "-----\n";
        swap(a[0] , a[min_element(all(a) , [](const Vector &a , const Vector &b){return a.x < b.x
            || (a.x == b.x && a.y < b.y);}) - a.begin()]);
        sort(1 + all(a) , [a](const Vector &b , const Vector &c){
            return leftTurn(a[0] , b , c);
        });

        for (auto x : a){
            cout << x << '\n';
        }
    }
}

signed main(){
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0); cout.precision(20);
    //freopen("input.txt" , "r" , stdin);

    for (int t = 1; t--;) solve();

    return 0;
}
/*

```


Task C ()

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

using namespace std;

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

#define pb push_back
#define eb emplace_back
#define mp make_pair
#define fi first
#define se second
#define print(x) { for(auto xxxxx : (x)) cout << xxxxx << ' '; cout << '\n'; }
#define all(x) (x).begin() , (x).end()
#define rall(x) (x).rbegin() , (x).rend()

ll next(){ll x; cin >> x; return x;}

const int inf = 2e9 , maxn = 2e5;
const ll mod = 1e9 + 7 , inf = 2e18;
const ld eps = 1e-8;

string t;

int solve(string s){
    int n = s.size() , m = t.size();

    int ans = m;
    for (int st = 0; st < n; st++){
        int cur = 0;
        for (int i = 0 , j = st; i < m; i++){
            // if(s == "kaban") {
            //     cout << i << ' ' << j << '\n';
            // }
            if (j >= n || s[j] != t[i]){
                cur++;
            } else {
                j++;
            }
        }
        ans = min(ans , cur);
    }
    return ans;
}

void solve(){
    cin >> t;

    int n; cin >> n;
    ll ans = 0;
    while(n-->0){
        string s; cin >> s;
        ans += solve(s);
        //cout << solve(s) << '\n';
    }
    cout << ans << '\n';
}

signed main(){
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0); cout.precision(20);
    //freopen("input.txt" , "r" , stdin);

    for (int t = 1; t--;) solve();

    return 0;
}
/*
```

* /

Task D ()

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

using namespace std;

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

#define pb push_back
#define eb emplace_back
#define mp make_pair
#define fi first
#define se second
#define print(x) { for(auto xxxxx : (x)) cout << xxxxx << ' '; cout << '\n'; }
#define all(x) (x).begin() , (x).end()
#define rall(x) (x).rbegin() , (x).rend()

ll next(){ll x; cin >> x; return x;}

const int intf = 2e9 , maxn = 1e3;
const ll mod = 1e9 + 7 , inf = 2e18;
const ld eps = 1e-8;

int n , m;
pii to[maxn][maxn] , st , fn;
bool was[maxn][maxn];
int d[maxn][maxn];

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

vector<pii> lst;
vector<pii> newlst;

void dfsrev(pii v){
    was[v.fi][v.se] = true;
    newlst.pb(v);
    for (int t = 0; t < 8; t++){
        pii u = {v.fi + nxt[t].fi , v.se + nxt[t].se};
        if (u.fi >= n || u.fi < 0 || u.se >= m || u.se < 0 || was[u.fi][u.se] || to[u.fi][u.se] != v) continue;
        d[u.fi][u.se] = d[v.fi][v.se];
        dfsrev(u);
    }
}

int ans = intf;
int solve1(){
    st.fi = , st.se = , fn.fi = , fn.se = ;

    lst.clear(); newlst.clear();
    for (int i = 0; i < n; i++){
        for (int j = 0; j < m; j++){
            was[i][j] = false;
        }
    }

    lst.pb(fn);
    while(!lst.empty()){
        newlst.clear();
        int curd = d[lst[0].fi][lst[0].se] + 1;
        while (!lst.empty()) {
            pii x = lst.back();
            lst.pop_back();
            if (was[x.fi][x.se]) continue;
            dfsrev(x);
        }

        for(auto v : newlst){
            for (int t = 0; t < 4; t++){
                pii u = {v.fi + nxt[t].fi , v.se + nxt[t].se};

```

```

        if (u.fi >= n || u.fi < 0 || u.se >= m || u.se < 0) continue;

        if (!was[u.fi][u.se]){
            d[u.fi][u.se] = curd;
            lst.pb(u);
        }
    }
}

return d[st.fi][st.se];
}

int dist(pii a , pii b){
    return abs(a.fi - b.fi) + abs(a.se - b.se);
}

void solve(){
    cin >> n >> m >> st.fi >> st.se >> fn.fi >> fn.se;
    if (st == fn){
        cout << "0\n";
        return;
    }

    for (int i = 0; i < n; i++){
        for (int j = 0; j < m; j++){
            int u = next() , v = next();
            to[i][j] = {i + u , j + v};
        }
    }

    pii st1 = st;

    solve1();

    st1.fi--, st1.se--;

    for (int t = 0; t < 8; t++){
        pii u = {st.fi + nxt[t].fi , st.se + nxt[t].se};
        if (u.fi >= n || u.fi < 0 || u.se >= m || u.se < 0) continue;

        ans = min(ans , d[u.fi][u.se] + dist(u , to[st.fi][st.se]));
    }

    cout << ans;
}

signed main(){
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0); cout.precision(20);
    //freopen("input.txt" , "r" , stdin);

    for (int t = 1; t--;) solve();

    return 0;
}
/*

*/

```


Task E ()

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

using namespace std;

#define int long long

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

#define pb push_back
#define eb emplace_back
#define mp make_pair
#define fi first
#define se second
#define print(x) { for(auto xxxxx : (x)) cout << xxxxx << ' '; cout << '\n'; }
#define all(x) (x).begin() , (x).end()
#define rall(x) (x).rbegin() , (x).rend()

ll next(){ll x; cin >> x; return x;}

const int intf = 2e9 , maxn = 2e5;
const ll mod = 1e9 + 7 , inf = 2e18;
const ld eps = 1e-8;

int q = 0;
const int Q = 8191;

pii operator +(pii a , pii b){
    return pii(a.fi + b.fi , a.se + b.se);
}

int n , m , B;
int id1 = 0 , id2 = 0;
vector<pii> p , ans;
vector<bool> can;

pii ask(pii a , pii b){
    // q++;
    // assert(q < Q);
    //if (rand() % 2) swap(a , b);
    cout << "? " << a.fi << ' ' << a.se << ' ' << b.fi << ' ' << b.se << endl;
    pii c; cin >> c.fi >> c.se;
    return c;
}

bool into(pii c , pii ans){
    return c.fi >= ans.fi && c.fi < ans.fi + n && c.se >= ans.se && c.se < ans.se + m;
}

void solve(){
    cin >> n >> m >> B;
    p.resize(B);
    for (auto &x : p) {
        cin >> x.fi >> x.se;
        //x = {1 , 1};
        x.fi — , x.se —;
    }

    ans.resize(1<<B);
    ans[0] = {0 , 0};
    for (int i = 1; i < ans.size(); i++){
        ans[i] = ans[i - 1] + mp(0LL , m + 1);
    }
    can.resize(1<<B , true);

    for (int j = 0; j < B; j++){
```

```

vector<int> toask;
for (int i = 0; i < can.size(); i++){
    if (can[i]) toask.pb(i);
}

for (int i = 0 , cnt = 0; i + 1 < toask.size() && cnt < (1 << (B - j - 1)); i += 2){
    int id1 = toask[i] , id2 = toask[i + 1];

    pii c = ask(ans[id1] + p[j] , ans[id2] + p[j]);
    cnt++;

    for (int k = 0; k < can.size(); k++){
        if (into(c , ans[k])) can[k] = false;
    }
}

//cout << q << endl;

for (int k = 0; k < can.size(); k++){
    if (can[k]){
        cout << "!_" << ans[k].fi << '_' << ans[k].se << '\n';
        return;
    }
}

}

signed main(){
    //ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0); cout.precision(20);
    //freopen("input.txt" , "r" , stdin);

    srand(time(0));

    for (int t = 1; t--;) solve();

    return 0;
}
/*

*/

```

Task F ()

[illegible]

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504 ,
0 ,
0 ,
0 ,
1512 ,
0 ,
10080 ,
0 ,
0 ,
0 ,
33264 ,
0 ,
75600 ,
0 ,
22680 ,
0 ,
189000 ,
0 ,
231840 ,
0 ,
136080 ,
0 ,
529200 ,
0 ,
241920 ,
0 ,
362880 ,
0 ,
665280 ,
0 ,
181440

```

0 ,
544320 ,
0 ,
423360 ,
0 ,
0 ,
0 ,
408240 ,
0 ,
362880 ,
0 ,
0 ,
0 ,
181440 ,
0 ,
0 ,
0 ,
0 ,
0 ,
0 ,
181440
}
};

    int n , m; cin >> n >> m;
    print(ans[n - 2]);
}

signed main(){
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0); cout.precision(20);
    //freopen("input.txt" , "r" , stdin);
    //freopen("output.txt" , "w" , stdout);

    for (int t = 1; t--;) solve();

    return 0;
}
/*

*/

```