Олимпиада СПбГУ по информатике 2019/20 учебного года

A	B	C	D	E	F	Sum
100	100	100	40	100	0	440

Task A ()

```cpp
//#define LOCAL
#include<bits/stdc++.h>
using namespace std;

typedef vector<int> vi;
typedef vector<vi> vvi;
typedef long long ll;
typedef long double ld;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
#define MP make_pair
#define PB push_back
#define IN insert
#define MT make_tuple
#define RS resize
#define F(i, a, b) for(int i = int(a); i <= int(b); i++)
#define f(i, a, b) for(int i = int(a); i >= int(b); i--)


int main(){
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    #ifdef LOCAL
    freopen("input.txt", "r", stdin);
    freopen("output.txt", "w", stdout);
    #endif
    int n;
    cin >> n;
    cout << n-1;
    return 0;
}
```

Task B ()

```cpp
//#define LOCAL
#include<bits/stdc++.h>
using namespace std;

typedef vector<int> vi;
typedef vector<vi> vvi;
typedef long long ll;
typedef long double ld;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
#define PB push_back
#define IN insert
#define MT make_tuple
#define RS resize
#define MP make_pair
#define F(i, a, b) for(int i = int(a); i <= int(b); i++)
#define f(i, a, b) for(int i = int(a); i >= int(b); i--)


void prnt(pair<ld, ld> x){
    cout << fixed << setprecision(3) << x.first << '_' << x.second << endl;
}

ld dis(pair<ld, ld> a, pair<ld, ld> b){
    ld q = a.first - b.first;
    ld w = a.second - b.second;
    return q*q + w*w;
}

int main(){
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    #ifdef LOCAL
    freopen("input.txt", "r", stdin);
    freopen("output.txt", "w", stdout);
    #endif
    int n;
    cin >> n;
    pair<ld, ld> p[7], c = make_pair(0.0, 0.0);
    cout << fixed << setprecision(5);
    if(n == 6){
        F(i, 1, 6){
            cin >> p[i].first >> p[i].second;
        }
        ld mx = 0;
        int q = -1;
        F(j, 2, 6){
            ld cur = dis(p[1], p[j]);
            if(cur > mx)
                mx = cur, q = j;
        }
        c.first = (p[1].first + p[q].first)/2.0, c.second = (p[1].second + p[q].second)/2.0;
        prnt(p[1]);
        prnt(p[q]);
        prnt(c);
    }else{
        pair<ld, ld> in[4];
        F(i, 1, 3)
            cin >> in[i].first >> in[i].second;
        pair<ld, ld> c;
        p[1] = in[1], p[4] = in[2], c = in[3];
        ld len = dis(p[1], c);
        ld hlen = len*3/4;
        prnt(p[1]);
        F(i, 2, 6){
            if(i == 4){
                prnt(p[4]);
                continue;
            }
            pair<ld, ld> ve = make_pair(p[i-1].first - c.first, p[i-1].second - c.second), no
                = make_pair(-ve.second, ve.first);
            ve.first /= 2.0, ve.second /= 2.0;
```

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```cpp
                //cerr << ve.first << ' ' <<  ve.second << ' ' << no.first << ' ' << no.second <<
                    endl;
                ld q = no.first*no.first + no.second*no.second;
                ld k = sqrt(hlen / q);
                //cerr << k << ' ';
                no.first *= k, no.second *= k;
                p[i] = MP(c.first + ve.first + no.first, c.second + ve.second + no.second);
                prnt(p[i]);

        }
    }
    return 0;
}
```

Task C ()

```cpp
//#define LOCAL
#include<bits/stdc++.h>
using namespace std;

typedef vector<int> vi;
typedef vector<vi> vvi;
typedef long long ll;
typedef long double ld;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
#define MP make_pair
#define PB push_back
#define IN insert
#define MT make_tuple
#define RS resize
#define F(i, a, b) for(int i = int(a); i <= int(b); i++)
#define f(i, a, b) for(int i = int(a); i >= int(b); i--)

int const N = 1e4 + 5, M = 507, inf = 1e9 + 7;
int dp[N][M];

int main(){
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    #ifdef LOCAL
    freopen("input.txt", "r", stdin);
    freopen("output.txt", "w", stdout);
    #endif
    string t;
    cin >> t;
    int sz = t.size();
    t = '$' + t;
    int n;
    cin >> n;
    ll ans = 0;
    F(i, 1, n){
        string s;
        cin >> s;
        int szs = s.size();
        s = '$' + s;
        F(i, 0, sz)
            dp[0][i] = i;
        int mn = inf;
        F(i, 1, szs){
            F(pos, 1, sz){
                if(t[pos] != s[i]){
                    dp[i][pos] = dp[i][pos-1]+1;
                    continue;
                }
                dp[i][pos] = min(dp[i][pos-1] +1, dp[i-1][pos-1]);
            }
            mn = min(dp[i][sz], mn);
        }
        ans += mn;
    }
    cout << ans;
    return 0;
}
```

Task D ()

```cpp
//#define LOCAL
#include<bits/stdc++.h>
using namespace std;

typedef vector<int> vi;
typedef vector<vi> vvi;
typedef long long ll;
typedef long double ld;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
#define MP make_pair
#define PB push_back
#define IN insert
#define MT make_tuple
#define RS resize
#define F(i, a, b) for(int i = int(a); i <= int(b); i++)
#define f(i, a, b) for(int i = int(a); i >= int(b); i--)


ll const inf = 1e15;

int const N = 1001;
ll ans[N][N];
pii mp[N][N];

int cost(int i, int j, int ni, int nj){
    pii ve = MP(ni - i - mp[i][j].first, nj - j - mp[i][j].second);
    return abs(ve.first) + abs(ve.second);
}

int main(){
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    #ifdef LOCAL
    freopen("input.txt", "r", stdin);
    freopen("output.txt", "w", stdout);
    #endif
    int n, m;
    cin >> n >> m;
    pii s, e;
    cin >> s.first >> s.second;
    cin >> e.first >> e.second;
    F(i, 1, n)
        F(j, 1, m)
            cin >> mp[i][j].first >> mp[i][j].second;
    set<pair<ll, pii> > q;
    q.IN(MP(0, s));
    F(i, 1, n)
        F(j, 1, m)
            ans[i][j] = inf;
    ans[s.first][s.second] = 0;
    while(q.size()){
        set<pair<ll, pii> >::iterator it = q.begin();
        ll cuan = it->first;
        int i = it->second.first, j = it->second.second;
        q.erase(it);
        F(ni, 1, n){
            F(nj, 1, m)
                if(ans[i][j] + cost(i, j, ni, nj) < ans[ni][nj]){
                    ans[ni][nj] = ans[i][j] + cost(i, j, ni, nj);
                    q.IN(MP(ans[ni][nj], MP(ni, nj)));
                }
        }
    }
    cout << ans[e.first][e.second];
    return 0;
}
```

Task E ()

```cpp
//#define LOCAL
#include<bits/stdc++.h>
using namespace std;

typedef vector<int> vi;
typedef vector<vi> vvi;
typedef long long ll;
typedef long double ld;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
#define MP make_pair
#define PB push_back
#define IN insert
#define MT make_tuple
#define RS resize
#define F(i, a, b) for(int i = int(a); i <= int(b); i++)
#define f(i, a, b) for(int i = int(a); i >= int(b); i--)

typedef set<int>::iterator iter;

int main(){
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    #ifdef LOCAL
    freopen("input.txt", "r", stdin);
    freopen("output.txt", "w", stdout);
    #endif
    ll n, m, b;
    cin >> n >> m >> b;
    pair<ll, ll> p[b+1];
    F(i, 1, b){
        int x, y;
        cin >> x >> y;
        p[i] = MP(x-1, y-1);
    }
    int lvl[16501];
    set<int> alive[b+1];
    F(i, 0, 9000){
        lvl[i] = 0;
        alive[0].IN(i);
    }
    int need[b+1];
    need[b] = 1;
    f(j, b-1, 0)
        need[j] = 2*need[j+1];
    F(i, 0, b-1){
        while(alive[i+1].size() < need[i+1]){
            ll a = *(alive[i].begin());
            alive[i].erase(a);
            ll b = *(alive[i].begin());
            alive[i].erase(b);
            lvl[a]++;
            lvl[b]++;
            alive[i+1].IN(a);
            alive[i+1].IN(b);
            cout << "?_" << a*n + p[i+1].first << '_' << p[i+1].second << '_' << b*n + p[i+1].
                first << '_' << p[i+1].second << endl;
            ll x, y;
            cin >> x >> y;
            ll d = x/n;
            if(alive[lvl[d]].count(d))
                alive[lvl[d]].erase(d);
        }
    }
    ll res = *(alive[b].begin());
    cout << "!_" << res*1ll*n << '_' << 0;
    return 0;
}
```

Task F ()