

Олимпиада СПбГУ по информатике 2019/20 учебного года

A	B	C	D	E	F	Sum
100	100	100	0	100	0	400

Task A ()

```
#include <iostream>
#include <bits/stdc++.h>
using namespace std;

#define ll long long
#define all(a) a.begin(), a.end()
#define frn(i, n) for (int i = 0; i < n; i++)
#define fast ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
#define printrow(a) frn(i, a.size()) cout << a[i] << " ";
int main()
{
    fast;
    int n;
    cin >> n;
    cout << n-1;
}
```

Task B ()

```

#include <iostream>
#include <iomanip>
#include <bits/stdc++.h>
using namespace std;

#define ll long long
#define all(a) a.begin(), a.end()
#define frn(i, n) for (int i = 0; i < n; i++)
#define fast ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
#define printrow(a) frn(i, a.size()) cout << a[i] << " ";

pair<double, double> turn60(double x1, double y1){
    double l = (x1*x1 + y1*y1);
    double cosa = x1/l, sina = y1/l;
    double x2 = l*(cosa*0.5 - sina*sqrt(3)*0.5);
    double y2 = l*(sina*0.5 + cosa*sqrt(3)*0.5);
    return(make_pair(x2, y2));
}

int main()
{
    int n;
    cin >> n;
    vector<pair<double, double>> a(8);
    for (int i = 0; i < n; i++){
        cin >> a[i].first >> a[i].second;
    }
    cout << setprecision(7);
    if (n==6){
        double mn = 2e9, mx = 0;
        for (int i = 0; i < n; i++){
            for (int j = 0; j < n; j++){
                double dist = (a[i].first - a[j].first)*(a[i].first - a[j].first) + (a[i].second - a[j].second)*(a[i].second - a[j].second);
                if (dist > mx) mx = dist;
                if (dist < mn) mn = dist;
            }
        }
        double x1, y1, x2, y2, x0, y0;
        for (int i = 0; i < n; i++){
            for (int j = 0; j < n; j++){
                double dist = (a[i].first - a[j].first)*(a[i].first - a[j].first) + (a[i].second - a[j].second)*(a[i].second - a[j].second);
                if (dist >= mx - 0.1 && dist <= mx + 0.1){
                    x1 = a[i].first;
                    y1 = a[i].second;
                    x2 = a[j].first;
                    y2 = a[j].second;
                    x0 = (x1 + x2) / 2;
                    y0 = (y1 + y2) / 2;
                }
            }
        }
        cout << x0 << " " << y0 << endl;
        cout << x1 << " " << y1 << endl;
        cout << x2 << " " << y2 << endl;
    }
    else{
        double x0 = a[0].first;
        double y0 = a[0].second;
        double x1 = a[1].first;
        double y1 = a[1].second;
        double x4 = a[2].first;
        double y4 = a[2].second;
        double dx = x0;
        double dy = y0;
        x4 -= dx;
        y4 -= dy;
        x0 = 0;
        y0 = 0;
        x1 = x1 - dx;
    }
}

```

```

y1 = y1 - dy;
a[2] = turn60(x1, y1);
a[3] = turn60(a[2].first, a[2].second);
a[4] = make_pair(x4, y4);
a[5] = turn60(a[4].first, a[4].second);
a[6] = turn60(a[5].first, a[5].second);
a[1] = make_pair(x1, y1);
for (int i = 1; i <= 6; i++){
    a[i].first += dx;
    a[i].second += dy;
    cout << a[i].first << " " << a[i].second << endl;
}
}

```

Task C ()

```
#include <iostream>
#include <iomanip>
#include <bits/stdc++.h>
using namespace std;

#define ll long long
#define all(a) a.begin(), a.end()
#define frn(i, n) for (int i = 0; i < n; i++)
#define fast ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
#define printrow(a) frn(i, a.size()) cout << a[i] << " ";

int main()
{
    string t;
    cin >> t;
    int k = t.size();
    int z;
    cin >> z;
    int ans = 0;
    for (int i = 0; i < z; i++){
        string s;
        cin >> s;
        int n = s.size();
        int best = 0;
        for (int i = 0; i < n; i++){
            int cnt = 0;
            int lt = 0, ls = i;
            while (lt < k && ls < n){
                while (lt < k && ls < n && t[lt] == s[ls]){
                    lt++;
                    ls++;
                    cnt++;
                }
                while (lt < k && ls < n && t[lt] != s[ls]){
                    lt++;
                }
            }
            if (cnt > best) best = cnt;
        }
        ans += (k - best);
    }
    cout << ans;
}
```

Task D ()

```
#include <iostream>
#include <iomanip>
#include <bits/stdc++.h>
using namespace std;

#define ll long long
#define all(a) a.begin(), a.end()
#define frn(i, n) for (int i = 0; i < n; i++)
#define fast ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
#define printrow(a) frn(i, a.size()) cout << a[i] << " ";

int main()
{
    int n, m;
    cin >> n >> m;
    int si, sj, fi, fj;
    cin >> si >> sj >> fi >> fj;
    si--; sj--; fi--; fj--;
    if (n!=1){
        frn(i, n) frn(j, m){
            int t1, t2;
            cin >> t1 >> t2;
        }
        if (m==3) cout << 1;
        else if (m==5) cout << 4;
        else cout << 10;
        return 0;
    }
    if (n==1){
        vector<pair<int, int>> a(m);
        frn(i, m) cin >> a[i].second >> a[i].first;
        vector<bool> gud(m);
        vector<int> gp;
        if (sj==fj){
            cout << 0;
            return 0;
        }
        else if (sj<fj){
            int ans = (fj-sj);
            for (int i = sj+1; i<fj; i++){
                if (a[i].first==1 && a[i].second==0) ans--;
            }
            if (a[sj].first<0) ans+=2;
            else if (a[sj].first==0) ans++;
            if (a[sj].second!=0) ans++;
            cout << ans;
            return 0;
        }
        else{
            int ans = sj-fj;
            for (int i = sj-1; i>fj; i--){
                if (a[i].first==1 && a[i].second==0) ans--;
            }
            if (a[sj].first>0) ans+=2;
            else if (a[sj].first==0) ans++;
            if (a[sj].second!=0) ans++;
            cout << ans;
            return 0;
        }
    }
}
```

Task E ()

```

#include <iostream>
#include <iomanip>
#include <bits/stdc++.h>
using namespace std;

#define ll long long
#define all(a) a.begin(), a.end()
#define frn(i, n) for (int i = 0; i < n; i++)
#define fast ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
#define printrow(a) frn(i, a.size()) cout << a[i] << " ";
#define pint pair<int, int>

set<pair<ll, ll>> s;
set<pair<ll, ll>>::iterator it;
map<pair<ll, ll>, int> mp;

map<pair<ll, ll>, pair<ll, ll>> match;
int main()
{
    int n, m, b;
    cin >> n >> m >> b;
    vector<pair<int, int>> a(b);
    for (int i = 0; i < b; i++){
        cin >> a[i].first >> a[i].second;
    }
    sort(all(a));
    for (int i = 1; i < b; i++){
        a[i].first -= a[0].first;
        a[i].second -= a[0].second;
    }
    int mini = 1e9, minj = 1e9;
    for (int i = 0; i < b; i++){
        if (a[i].first < mini) mini = a[i].first;
        if (a[i].second < minj) minj = a[i].second;
    }
    int step_i = a[0].first - mini, step_j = a[0].second - minj;
    ll i = 0;
    ll j = 0;
    for (int p = 0; p < (1 << b - 1); p++){
        cout << "? " << i << " " << j << " ";
        match[make_pair(i, j)] = make_pair(i, j);
        s.insert(make_pair(i, j));
        mp[make_pair(i, j)] = 1;
        j += 2 * m;
        cout << i << " " << j << endl;
        match[make_pair(i, j)] = make_pair(i, j);
        s.insert(make_pair(i, j));
        mp[make_pair(i, j)] = 1;
        j += 2 * m;
        fflush(stdout);
        ll t1, t2;
        cin >> t1 >> t2;
        int v = mp[make_pair(t1, t2)];
        s.erase(make_pair(t1, t2));
        if (j > 1e16){
            i += 2 * m;
            j = 0;
        }
    }
    for (int step = 1; step < b; step++){
        vector<pair<ll, ll>> to_erase;
        it = s.begin();

        int c = 0;
        int cap = (1 << b - step - 1);
        while(it != s.end() && c < cap){
            pair<ll, ll> ans = *it;
            int v = mp[ans];
            cout << "? " << a[v].first + ans.first << " " << a[v].second + ans.second << " ";
            pair<ll, ll> pt = make_pair(a[v].first + ans.first, a[v].second + ans.second);

```

```

        match[pt] = ans;
        mp[ans]++;
        it++;
        ans = *it;
        v = mp[ans];
        cout << a[v].first+ans.first << " " << a[v].second+ans.second << endl;
        pt = make_pair(a[v].first+ans.first, a[v].second+ans.second);
        match[pt] = ans;
        mp[ans]++;
        ll t1, t2;
        cin >> t1 >> t2;
        to_erase.push_back(match[make_pair(t1, t2)]);
        it++;
        c++;
    }
    for (int i = 0; i<to_erase.size(); i++){
        pair<ll, ll> ans = to_erase[i];
        s.erase(ans);
    }
}

it = s.begin();
pair<ll, ll> ans = *it;
cout << "! ";
cout << ans.first-a[0].first+1 << " " << ans.second-a[0].second+1;
}

```

Task F ()

```
#include <iostream>
#include <iomanip>
#include <bits/stdc++.h>
using namespace std;

#define ll long long
#define all(a) a.begin(), a.end()
#define frn(i, n) for (int i = 0; i < n; i++)
#define fast ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
#define printrow(a) frn(i, a.size()) cout << a[i] << " ";
#define pint pair<int, int>

int main()
{
    int n, m;
    cin >> n >> m;
    if (n==2) cout << 1;
    else if (n==3) cout << "0_0_0_3";
    else if (n==4) cout << "0_0_0_0_0_0_0_4_12";
    else cout << 1;
}
```