Олимпиада СПбГУ по информатике 2019/20 учебного года

A	B	C	D	E	F	Sum
100	100	100	40	63	0	403

Task A ()

```cpp
#include <bits/stdc++.h>
#pragma GCC optimize("O3")
#pragma GCC optimize("-Ofast")
#pragma GCC optimize("unroll-loops")
#pragma GCC target("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,tune=native")
#define fastIO ios_base::sync_with_stdio(0); cin.tie(0);
#define forn(i,a,b) for (int i = (a); i < (b); i++)
#define fi first
#define se second
#define all(x) (x).begin(),(x).end()
#define re return
#define VI vector<int>
#define ll long long
#define ld long double
#define mp make_pair
#define pb push_back
#define mt make_tuple
#define debug(x) cout << #x << " is " << x << "\n";
#define debug2(x) cout << #x << " is " << " "; for (auto elem : x) cout << elem << " ";cout << "\n";

using namespace std;

int main() {
    int n; cin >> n;
    cout << n-1 << "\n";
    return 0;
}
```

Task B ()

```cpp
#include <bits/stdc++.h>
#define fastIO ios_base::sync_with_stdio(0); cin.tie(0);
#define forn(i,a,b) for (int i = (a); i < (b); i++)
#define fi first
#define se second
#define all(x) (x).begin(),(x).end()
#define re return
#define VI vector <int>
#define ll long long
#define ld long double
#define mp make_pair
#define pb push_back
#define mt make_tuple
#define debug(x) cout << #x << " is " << x << "\n";
#define debug2(x) cout << #x << " is " << " "; for (auto elem : x) cout << elem << " ";cout << "\n";

using namespace std;

struct Point{
    ld x, y;
    Point (ld a = 0, ld b = 0) {
    x = a;
    y = b;
    }
};

istream & operator >> (istream & in, Point & A) {
    in >> A.x >> A.y;
    return in;
}

ostream & operator << (ostream & out, Point & A) {
    out << A.x << " " << A.y << "\n";
}

const double eps = 1e-6;

inline bool ge(ld a, ld b) {
    return abs(b-a) < eps;
}

bool cmp(const Point & A, const Point & B) {
    return atan2(A.y, A.x) < atan2(B.y,B.x);
}

struct Vector{
    ld x, y;
    Vector (Point A, Point B) {
        x = B.x - A.x;
        y = B.y - A.y;
    }
    ld len() {
        return sqrt(x*x+y*y);
    }
    ld cross_product(Vector B) {
        return x * B.y - y * B.x;
    }
};

int main() {
    cout.setf(ios::fixed);
    cout.precision(20);
    int k;
    cin >> k;
    if (k == 6) {
        vector <Point> A(6);
        for (auto & x : A) {
            cin >> x;
        }
        ld minx = 1e9;
        ld miny = 1e9;
```

```cpp
        for (auto elem : A) {
            if (elem.y < miny || (ge(elem.y,miny) && elem.x < minx)) {
                minx = elem.x;
                miny = elem.y;
            }
        }
        for (auto & elem : A) {
            elem.x -= minx;
            elem.y -= miny;
        }
        sort(all(A), cmp);
        for (auto & elem : A) {
            elem.x += minx;
            elem.y += miny;
        }
        Point M;
        for (auto elem : A) {
            M.x += elem.x;
            M.y += elem.y;
        }
        M.x /= 6;
        M.y /= 6;
        cout << M << A[0] << A[1];
    } else {
        Point M;
        vector <Point> A(6);
        cin >> M >> A[0] >> A[1];
        A[3].x = 2*M.x - A[0].x;
        A[3].y = 2*M.y - A[0].y;
        A[4].x = 2*M.x - A[1].x;
        A[4].y = 2*M.y - A[1].y;
        Vector FL(A[3], M);
        ld len = FL.len();
        Vector AB(A[1], A[3]);
        Point H( (A[1].x + A[3].x)/2, (A[1].y + A[3].y)/2);
        Vector HELP(M,H);
        A[2].x = 2*HELP.x + M.x;
        A[2].y = 2*HELP.y + M.y;
        A[5].x = 2*M.x - A[2].x;
        A[5].y = 2*M.y - A[2].y;
        for (auto elem : A) {
            cout << elem;
        }
    }
    return 0;
}
```

Task C ()

```cpp
#include <bits/stdc++.h>
#pragma GCC optimize("O3")
#pragma GCC optimize("-Ofast")
#pragma GCC optimize("unroll-loops")
#pragma GCC target("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,tune=native")
#define fastIO ios_base::sync_with_stdio(0); cin.tie(0);
#define forn(i,a,b) for (int i = (a); i < (b); i++)
#define fi first
#define se second
#define all(x) (x).begin(),(x).end()
#define re return
#define VI vector <int>
#define ll long long
#define ld long double
#define mp make_pair
#define pb push_back
#define mt make_tuple
#define debug(x) cout << #x << " is " << x << "\n";
#define debug2(x) cout << #x << " is " << " "; for (auto elem : x) cout << elem << " ";cout << "\n";

using namespace std;

string s;
vector <vector <int> > pos(26);

int main() {
//   fastIO;
    cin >> s;
    for (int i = 0; i < s.size(); i++) {
        pos[s[i] - 'a'].pb(i);
    }
    int n; cin >> n;
    ll ans = 0;
    for (int test = 0; test < n; test++) {
            string t;
        cin >> t;
        int cur = s.size();
        for (int i = 0; i < t.size(); i++) {
            if (!pos[t[i] - 'a'].empty()) {
                int j = pos[t[i] - 'a'][0];
                int k = i;
                bool ch = false;
                while(true) {
                    if (k+1 == t.size()) {
                        break;
                    }
                    int nxt = t[k+1] - 'a';
                    ch = false;
                    for (auto elem : pos[nxt]) {
                        if (elem > j) {
                                j = elem;
                                ch = true;
                                break;
                        }
                    }
                    if (!ch) {
                        break;
                    }
                    k++;
                }
                cur = min(cur, (int)s.size()-(k-i+1));
            }
        }
        // debug(cur);
         ans += cur;
    }
    cout << ans << "\n";
    return 0;
}
```

Task D ()

```cpp
#include <bits/stdc++.h>
#define fastIO ios_base::sync_with_stdio(0); cin.tie(0);
#define forn(i,a,b) for (int i = (a); i < (b); i++)
#define fi first
#define se second
#define all(x) (x).begin(),(x).end()
#define re return
#define VI vector <int>
#define ll long long
#define ld long double
#define mp make_pair
#define pb push_back
#define mt make_tuple
#define debug(x) cout << #x << "_is_" << x << "\n";
#define debug2(x) cout << #x << "_is_" << "_"; for (auto elem : x) cout << elem << "_";cout << "\n
    ";
#define INF 1e9

using namespace std;

int main() {
    // fastIO;
    int n,m;
    cin >> n >> m;
    int ar,ac,br,bc;
    cin >> ar >> ac >> br >> bc;
    ar--;ac--;br--;bc--;
    vector <vector <pair <int, int> > > a(n, vector <pair <int,int> >(m));
    forn(i, 0, n) {
        forn(j, 0, m) {
            cin >> a[i][j].fi >> a[i][j].se;
        }
    }
    vector <vector <int> > dist(n, vector <int> (m, INF));
    dist[ar][ac] = 0;
    set <pair <int,pair <int, int> > > s;
    s.insert({dist[ar][ac], {ar,ac}});
    while (!s.empty()) {
        auto x = s.begin()->second;
        int i = x.fi;
        int j = x.se;
        s.erase(s.begin());
        for (int v = -j-a[i][j].se; v < m-j-a[i][j].se;v++) {
            for (int u = -i-a[i][j].fi; u < n-a[i][j].fi-i; u++) {
                int v1 = j + v + a[i][j].se;
                int u1 = i + u + a[i][j].fi;
                if (dist[i][j] + abs(v) + abs(u) < dist[u1][v1]) {
                    s.erase({dist[u1][v1], {u1,v1}});
                    dist[u1][v1] = dist[i][j] + abs(v) + abs(u);
                    s.insert({dist[u1][v1], {u1,v1}});
                }
            }
        }
    }
    cout << dist[br][bc] << "\n";
    return 0;
}
```

Task E ()

```cpp
#include <bits/stdc++.h>
#define fastIO ios_base::sync_with_stdio(0); cin.tie(0);
#define forn(i,a,b) for (int i = (a); i < (b); i++)
#define fi first
#define se second
#define all(x) (x).begin(),(x).end()
#define re return
#define VI vector <int>
#define ll long long
#define ld long double
#define mp make_pair
#define pb push_back
#define mt make_tuple
#define debug(x) cout << #x << " is " << x << "\n";
#define debug2(x) cout << #x << " is " << " "; for (auto elem : x) cout << elem << " ";cout << "\n";
using namespace std;
#define int ll
int n,m,B;
vector <pair <int, int> > points;
priority_queue<int> used;
priority_queue<int> s;
vector <bool> non_act((1 << 13)+2, false);

inline void ans(int k1, int k2, int i) {
    cout << "? " << k1*1ll*n + points[i].fi << " " << k1*1ll*m+points[i].se << " " <<
    k2*1ll*n + points[i].fi << " " << k2*1ll*m+points[i].se << endl;
}

int num_q = 0;

void run(int k) {
    for (int i = 0; i < (1 << k); i+= 2) {
        int fir = s.top();
        s.pop();
        while(non_act[fir]) {
            fir = s.top();
            s.pop();
        }
        int sec = s.top();
        s.pop();
        while(non_act[sec]) {
            sec = s.top();
            s.pop();
        }
        used.push(fir);
        used.push(sec);
        ans(fir, sec, k-1);
        num_q += 2;
        ll del1,del2;
        cin >> del1 >> del2;
        ll n1 = del1/n;
        ll m1 = del2/m;
        if (n1 == m1 && n1 <= (1 << 13) + 1 && n1 >= 0) {
            non_act[n1] = true;
        }
    }
    if (B >= 13) {
        while(!s.empty()) {
            s.pop();
        }
    }
    while(!used.empty()) {
        int v = used.top();
        used.pop();
        if (!non_act[v]) {
            s.push(v);
        }
    }
}

signed main() {
```

```cpp
    cin >> n >> m >> B;
    points.resize(B);
    forn(i, 0, B) {
        cin >> points[i].fi >> points[i].se;
        points[i].fi--;
        points[i].se--;
    }
    for (int i = 2; i <= (1 << 13) + 1; i++) {
        s.push(i);
    }
    for (int i = B; i >= 1; i--) {
        run(i);
    }
    if (s.empty()) {
        return 1;
    }
    if (num_q > 8191) {
        return 1;
    }
    int v = s.top();
    cout << "! " << v*1ll*n << " " << v*1ll*m << endl;
    return 0;
}
```

Task F ()

```cpp
#include <bits/stdc++.h>
#pragma GCC optimize("O3")
#pragma GCC optimize("-Ofast")
#pragma GCC optimize("unroll-loops")
#pragma GCC target("sse,sse2,sse3,ssse3,sse4,popcnt,abm,mmx,avx,tune=native")
#define fastIO ios_base::sync_with_stdio(0); cin.tie(0);
#define forn(i,a,b) for (int i = (a); i < (b); i++)
#define fi first
#define se second
#define all(x) (x).begin(),(x).end()
#define re return
#define VI vector<int>
#define ll long long
#define ld long double
#define mp make_pair
#define pb push_back
#define mt make_tuple
#define debug(x) cout << #x << " is " << x << "\n";
#define debug2(x) cout << #x << " is " << " "; for (auto elem : x) cout << elem << " ";cout << "\n";

using namespace std;

int main() {
    int n, m;
    cin >> n >> m;
    if (n == 2) {
        cout << 1 ;
    } else if (n == 3) {
        for (int i = 0; i < m; i++) {
            if (i == 3) {
                cout << 3 << " ";
            } else {
                cout << 0 << " ";
            }
        }
    } else if (n == 4) {
    cout << "0 0 0 0 0 0 0 0 4 12" << "\n";
    }
    return 0;
}
```