

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 <iostream>
#include <vector>
#include <set>
#include <map>

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef pair<int, int> pii;

#define pb push_back
#define F first
#define S second

using namespace std;

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

Task B ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <cmath>
#include <algorithm>

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef pair<int, int> pii;
typedef vector<pii> vpii;
typedef vector<double> vd;
typedef pair<double, double> pdd;
typedef vector<pdd> vpdd;
typedef vector<vd> vvd;

#define forn(i0, n0) for (int i0 = 0; i0 < n0; ++i0)
#define pb push_back
#define F first
#define S second
#define all(arr) arr.begin(), arr.end()

using namespace std;

int main(){
    int n;
    cin >> n;
    if (n == 6){
        vpdd a0(6);
        forn(i, 6) cin >> a0[i].F >> a0[i].S;
        double x = (a0[0].F + a0[1].F) / 2, y = (a0[0].S + a0[1].S) / 2;
        vvd a(6, vd(3));
        forn(i, 6){
            a[i][1] = a0[i].F, a[i][2] = a0[i].S;
            a[i][0] = atan2(a[i][2] - y, a[i][1] - x);
        }
        sort(all(a));
        for (int i = 0; i < 6; i += 2) cout << a[i][1] << ' ' << a[i][2] << '\n';
    } else {
        vpdd a(6);
        forn(i, 3) cin >> a[2 * i].F >> a[2 * i].S;
        double X = 0, Y = 0;
        forn(i, 3){
            X += a[2 * i].F, Y += a[2 * i].S;
        }
        X /= 3., Y /= 3.;
        for(int i = 1; i <= 5; i += 2){
            int j = (i + 3) % 6;
            double x = a[j].F, y = a[j].S;
            double dx = x - X, dy = y - Y;
            a[i].F = X - dx, a[i].S = Y - dy;
        }
        forn(i, 6) cout << a[i].F << ' ' << a[i].S << '\n';
    }

    return 0;
}
```

Task C ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <cmath>
#include <algorithm>

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef pair<int, int> pii;
typedef vector<pii> vpii;
typedef vector<double> vd;
typedef pair<double, double> pdd;
typedef vector<pdd> vpdd;
typedef vector<vd> vvd;
typedef vector<vi> vvi;

#define forn(i0, n0) for (int i0 = 0; i0 < n0; ++i0)
#define pb push_back
#define F first
#define S second
#define all(arr) arr.begin(), arr.end()

using namespace std;

int main(){
    string t;
    int n;
    cin >> t >> n;
    vvi pos(26);
    forn(i, t.length()){
        pos[t[i] - 'a'].pb(i);
    }
    int ans = 0;
    forn(i, n){
        string s;
        cin >> s;
        int l = s.length();
        int minn = t.length();
        forn(i, l){
            int cnt = 0;
            int j = i;
            int I = -1;
            while (j < l){
                int c = s[j] - 'a';
                if (pos[c].empty() || I >= pos[c].back()) break;
                I = *upper_bound(all(pos[c]), I);
                j++;
                cnt++;
            }
            minn = min(minn, (int) t.length() - cnt);
        }
        ans += minn;
    }
    cout << ans << '\n';
    return 0;
}
```

Task D ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <cmath>
#include <algorithm>

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef pair<int, int> pii;
typedef vector<pii> vpii;
typedef vector<double> vd;
typedef pair<double, double> pdd;
typedef vector<pdd> vpdd;
typedef vector<vd> vvd;
typedef vector<vi> vvi;

#define forn(i0, n0) for (int i0 = 0; i0 < n0; ++i0)
#define pb push_back
#define F first
#define S second
#define all(arr) arr.begin(), arr.end()

using namespace std;

const int inf = 1e9;

int n, m;

int id(int i, int j, int k){
    return 2 * i * (m + 2) + j * 2 + k;
}

int x(int id){
    return id / (2 * m + 4);
}

int y(int id){
    return (id / 2) % (m + 2);
}

int k(int id){
    return id % 2;
}

int main(){
    cin >> n >> m;
    int X1, Y1, X2, Y2;
    cin >> X1 >> Y1 >> X2 >> Y2;
    int dx[n + 2][m + 2], dy[n + 2][m + 2];
    forn(i, n + 2){
        forn(j, m + 2) dx[i][j] = dy[i][j] = 10000;
    }
    forn(i, n){
        forn(j, m) cin >> dx[i + 1][j + 1] >> dy[i + 1][j + 1];
    }
    vector<vvi> d(2, vvi(n + 2, vi(m + 2, inf)));
    d[0][X1][Y1] = 0;
    set<pii> prq;
    forn(i, n + 2){
        forn(j, m + 2){
            forn(k, 2){
                prq.insert({d[k][i][j], id(i, j, k)});
            }
        }
    }
    while (!prq.empty()){
        int v = prq.begin()->S;
        prq.erase(prq.begin());
        //cout << v << '\n';
    }
}
```

```

//cout << x(v) << ' ' << y(v) << '\n';
if (v % 2 == 0){
    int x1 = x(v), y1 = y(v), x2 = x1 + dx[x1][y1], y2 = y1 + dy[x1][y1];
    if (x2 < 0 || y2 < 0 || x2 >= n + 2 || y2 >= m + 2) continue;
    if (d[1][x2][y2] > d[0][x1][y1]){
        prq.erase({d[1][x2][y2], id(x2, y2, 1)});
        d[1][x2][y2] = d[0][x1][y1];
        prq.insert({d[1][x2][y2], id(x2, y2, 1)});
    }
} else {
    for (int dx = -1; dx <= 1; ++dx){
        for (int dy = -1; dy <= 1; ++dy){
            int x1 = x(v), y1 = y(v), x2 = x1 + dx, y2 = y1 + dy;
            if (x2 < 0 || y2 < 0 || x2 >= n + 2 || y2 >= m + 2) continue;
            int w = abs(dx) + abs(dy);
            for(k, 2){
                if (d[k][x2][y2] > d[1][x1][y1] + w){
                    prq.erase({d[k][x2][y2], id(x2, y2, k)});
                    d[k][x2][y2] = d[1][x1][y1] + w;
                    prq.insert({d[k][x2][y2], id(x2, y2, k)});
                }
            }
        }
    }
}
cout << d[0][X2][Y2] << '\n';
return 0;
}

```

Task E ()

```

#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <cmath>
#include <algorithm>

using namespace std;

typedef long long ll;
typedef vector<int> vi;
typedef pair<int, int> pii;
typedef vector<pii> vpii;
typedef vector<double> vd;
typedef pair<double, double> pdd;
typedef vector<pdd> vpdd;
typedef vector<vd> vvd;
typedef vector<vi> vvi;

#define forn(i0, n0) for (int i0 = 0; i0 < n0; ++i0)
#define pb push_back
#define F first
#define S second
#define all(arr) arr.begin(), arr.end()

using namespace std;

const int N = 10000;
bool shot[N];

const int D = 1000000;

void paint(int x1, int y1, int x2, int y2){
    cout << "?_ " << x1 << '_ ' << y1 << '_ ' << x2 << '_ ' << y2 << '\n';
    //fflush(stdout);
    int x, y;
    cin >> x >> y;
    x--, y--;
    x /= D, y /= D;
    int I = x * 100 + y;
    shot[I] = 1;
}

int main(){
    int n, m, b;
    cin >> n >> m >> b;
    vpii a(b);
    forn(i, b) cin >> a[i].F >> a[i].S;
    int num = 1 << b;
    forn(i, b){
        int z = 0;
        forn(j, num / 2){
            vi I;
            while (I.size() < 2){
                if (!shot[z]){
                    I.pb(z);
                }
                z++;
            }
            int dx1 = D * (I[0] / 100);
            int dy1 = D * (I[0] % 100);
            int dx2 = D * (I[1] / 100);
            int dy2 = D * (I[1] % 100);
            paint(a[i].F + dx1, a[i].S + dy1, a[i].F + dx2, a[i].S + dy2);
        }
        num >>= 1;
    }
    int dx = 0, dy = 0;
    forn(i, N){
        if (!shot[i]){
            cout << "!_ " << (i / 100) * D + 1 << '_ ' << (i % 100) * D + 1 << '\n';
            return 0;
        }
    }
}

```

```
    }  
  }  
  return 0;  
}
```

Task F ()

[illegible]

```

        queue<int> q;
        q.push(i);
        vi d(n, -1);
        d[i] = 0;
        while (!q.empty()) {
            int v = q.front();
            q.pop();
            for (int i, g[v].size(); i < g[v].size(); i++) {
                int u = g[v][i];
                if (d[u] == -1) {
                    d[u] = d[v] + 1;
                    sum += d[u];
                    q.push(u);
                }
            }
        }
        sum /= 2;
        ans[sum - 1]++;
        return;
    }
    int j = 0;
    if (!e1.empty()) j = e1.back() + 1;
    for (int i = j; i < e.size(); ++i) {
        e1.pb(i);
        go(e1);
        e1.pop_back();
    }
}

int main() {
    cin >> n >> m;
    for (int i = 0; i < n; i++) {
        for (int j = i + 1; j < n; ++j) e.pb({i, j});
    }
    m = e.size();
    vi e0;
    if (n <= 7) {
        go(e0);
        for (int i = 0; i < n; i++) cout << ans[i] << ' ';
        cout << '\n';
    }
    if (n == 8) cout << s8 << '\n';
    if (n == 9) cout << s9 << '\n';
    return 0;
}

```