

# Олимпиада СПбГУ по информатике 2019/20 учебного года

A	B	C	D	E	F	Sum
100	100	100	40	100	100	540

## Task A ()

```
print(int(input()) - 1)
```

## Task B ()

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

using namespace std;

struct Point{
    long double x, y;
    Point(){
    }
    Point (long double _x, long double _y){
        x = _x;
        y = _y;
    }
};

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

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

long long cross(const Point &a, const Point &b){
    return a.x * b.y - a.y * b.x;
}

int main(){
    ios::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);

    int n;
    cin >> n;
    if (n == 6){
        vector<Point> A(n);
        for (int i = 0; i < n; ++i)
            cin >> A[i].x >> A[i].y;
        int first = 0;
        for (int i = 1; i < n; ++i){
            if (A[i].y < A[first].y || (A[i].y == A[first].y && A[i].x < A[first].x))
                first = i;
        }
        swap(A[0], A[first]);
        sort(A.begin() + 1, A.end(), [&A](const Point &a, const Point &b){
            return cross(a - A[0], b - A[0]) > 0;
        });
        cout << setprecision(50) << A[0].x << '\u' << setprecision(50) << A[0].y << '\n';
        cout << setprecision(50) << A[2].x << '\u' << setprecision(50) << A[2].y << '\n';
        cout << setprecision(50) << A[3].x << '\u' << setprecision(50) << A[3].y << '\n';
    } else {
        Point A, B, C;
        cin >> A.x >> A.y >> B.x >> B.y >> C.x >> C.y;
        Point side = B - C;
        long double cos = 0.5;
        long double sin = sqrt((long double)3) / 2;
        Point add = Point(side.x * cos - side.y * sin, side.x * sin + side.y * cos);
        cout << A.x << '\u' << A.y << '\n';
        cout << (A + add).x << '\u' << (A + add).y << '\n';
        cout << B.x << '\u' << B.y << '\n';
        cout << C.x << '\u' << C.y << '\n';
        cout << (C - add).x << '\u' << (C - add).y << '\n';
        cout << (A - side).x << '\u' << (A - side).y << '\n';
    }
    return 0;
}
```

## Task C ()

```
#include <set>
#include <vector>
#include <iomanip>
#include <iostream>
#include <algorithm>

using namespace std;

int dp[10001][501];

int main(){
    ios::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);

    string t;
    cin >> t;
    int k = t.size();
    int ans = 0;
    int q;
    cin >> q;
    while (q--){
        string s;
        cin >> s;
        int n = s.size();
        int mx = 0;
        fill(dp[0], dp[0] + k + 1, 0);
        for (int i = 0; i < n; ++i){
            dp[i + 1][0] = 0;
            for (int j = 0; j < k; ++j){
                if (s[i] == t[j])
                    dp[i + 1][j + 1] = dp[i][j] + 1;
                else
                    dp[i + 1][j + 1] = 0;
                dp[i + 1][j + 1] = max(dp[i + 1][j], dp[i + 1][j + 1]);
                mx = max(mx, dp[i + 1][j + 1]);
            }
        }
        ans += k - mx;
    }
    cout << ans << '\n';
    return 0;
}
```

## Task D ()

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

using namespace std;

int r[1000][1000];
int c[1000][1000];

int dp[1000][1000];

const int INF = 1e9;

int main(){
    ios::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);

    int n, m;
    cin >> n >> m;
    int ax, ay, bx, by;
    cin >> ax >> ay >> bx >> by;
    --ax;
    --ay;
    --bx;
    --by;
    for (int i = 0; i < n; ++i){
        for (int j = 0; j < m; ++j){
            cin >> r[i][j] >> c[i][j];
            dp[i][j] = INF;
        }
    }
    dp[ax][ay] = 0;
    set<pair<int, pair<int, int>>> Q;
    Q.emplace(0, make_pair(ax, ay));
    while (!Q.empty()){
        auto cur = Q.begin()->second;
        Q.erase(Q.begin());
        for (int newx = 0; newx < n; ++newx){
            for (int newy = 0; newy < m; ++newy){
                int len = abs(newx - cur.first - r[cur.first][cur.second]) + abs(newy - cur.second - c[cur.first][cur.second]);
                if (dp[newx][newy] > dp[cur.first][cur.second] + len){
                    Q.erase(make_pair(dp[newx][newy], make_pair(newx, newy)));
                    dp[newx][newy] = dp[cur.first][cur.second] + len;
                    Q.insert(make_pair(dp[newx][newy], make_pair(newx, newy)));
                }
            }
        }
    }
    cout << dp[bx][by] << '\n';
    return 0;
}
```

## Task E ()

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

using namespace std;

pair<long long, long long> operator +(const pair<long long, long long> &a, const pair<long long,
long long> &b){
    return make_pair(a.first + b.first, a.second + b.second);
}

pair<long long, long long> query(pair<long long, long long> a, pair<long long, long long> b){
    cout << '?' << '\n' << a.first << '\n' << a.second << '\n' << b.first << '\n' << b.second << endl;
    long long x = a.first, y = a.second;
    cin >> x >> y;
    return make_pair(x, y);
}

int main(){
    long long n, m, b;
    cin >> n >> m >> b;
    vector<pair<long long, long long>> A(b);
    for (long long i = 0; i < b; ++i){
        cin >> A[i].first >> A[i].second;
        --A[i].first;
        --A[i].second;
    }
    vector<pair<long long, long long>> corner(1 << b);
    map<pair<long long, long long>, long long> id;
    set<long long> alive;
    for (long long i = 0; i < (1ll << b); ++i){
        corner[i] = make_pair(i * n, 0);
        alive.insert(i);
        for (long long j = 0; j < b; ++j)
            id[corner[i] + A[j]] = i;
    }
    for (long long i = 0; i < (1ll << (b - 1)); ++i){
        auto tmp = query(corner[2 * i] + A[0], corner[2 * i + 1] + A[0]);
        alive.erase(id[tmp]);
    }
    while (alive.size() > (1ll << (b - 1)))
        alive.erase(alive.begin());
    for (long long step = 1; step < b; ++step){
        set<long long> alive2 = alive;
        while (!alive.empty()){
            long long i1 = *alive.begin();
            alive.erase(alive.begin());
            long long i2 = *alive.begin();
            alive.erase(alive.begin());
            auto tmp = query(corner[i1] + A[step], corner[i2] + A[step]);
            alive2.erase(id[tmp]);
        }
        long long len = (1 << (b - step - 1));
        while (alive2.size() > len)
            alive2.erase(alive2.begin());
        alive = alive2;
    }
    long long i = *alive.begin();
    cout << '!' << '\n' << corner[i].first << '\n' << corner[i].second << endl;
    return 0;
}
```

## Task F ()

```
#include <set>
#include <vector>
#include <iomanip>
#include <iostream>
#include <algorithm>

using namespace std;

const int INF = 1e9;
const long long MOD = 1e9 + 7;

long long dp[27][26 * 27 / 2 + 1][25 * 26 * 27 / 6 + 1];

long long c[27][27];
long long antifact[27];

long long pow(long long a, long long n){
    if (n == 0)
        return 1;
    if (n % 2 == 1)
        return pow(a, n - 1) * a % MOD;
    long long tmp = pow(a, n / 2);
    return tmp * tmp % MOD;
}

struct tree{
    int n, s, p;
    tree(int _n = 1, int _s = 0, int _p = 0){
        n = _n;
        s = _s;
        p = _p;
    }
    bool operator==(const tree &b) const{
        return n == b.n && s == b.s && p == b.p;
    }
};

tree merge(const tree &a, const tree &b){
    return tree(a.n + b.n, a.s + b.n + b.s, a.p + b.p + a.n * b.s + b.n * a.s + a.n * b.n);
}

vector<tree> pos[27];

tree cur[27];

void gen(int n, int sum, int mx_n, int mx_i, int id, tree now){
    //cout << n << ' ' << sum << ' ' << now.n << ' ' << now.s << ' ' << now.p << '\n';
    if (sum == n - 1){
        long long cnt = 1;
        int rest = n - 1;
        for (int i = 0; i < id; ++i){
            cnt = (cnt * c[rest][cur[i].n] % MOD * cur[i].n % MOD * dp[cur[i].n][cur[i].s][cur[i].p] % MOD;
            rest -= cur[i].n;
        }
        int same = 1;
        for (int i = 1; i < id; ++i){
            if (cur[i] == cur[i - 1])
                ++same;
            else {
                cnt = cnt * antifact[same] % MOD;
                same = 1;
            }
        }
        cnt = cnt * antifact[same] % MOD;
        dp[now.n][now.s][now.p] += cnt;
        if (dp[now.n][now.s][now.p] >= MOD)
            dp[now.n][now.s][now.p] -= MOD;
        return;
    }
    for (int k = min(mx_n, n - sum - 1); k >= 1; --k){
        for (int i = min((k == mx_n ? mx_i : INF), (int)pos[k].size() - 1); i >= 0; --i){
```

[illegible]

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int main(){
    ios::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);

    c[0][0] = 1;
    for (int i = 1; i < 27; ++i){
        c[i][0] = 1;
        for (int j = 1; j <= i; ++j){
            c[i][j] = c[i - 1][j - 1] + c[i - 1][j];
            if (c[i][j] >= MOD)
                c[i][j] -= MOD;
        }
    }
    antifact[0] = 1;
    for (int i = 1; i < 27; ++i){
        antifact[i] = (antifact[i - 1] * pow((long long)i, MOD - 2)) % MOD;
    }
    int n, m;
    cin >> n >> m;
    if (n == 24){
        for (int i: ans24)
            cout << i << ' ';
        cout << '\n';
        return 0;
    }
    if (n == 25){
        for (int i: ans25)
            cout << i << ' ';
        cout << '\n';
        return 0;
    }
    if (n == 26){
        for (int i: ans26)
            cout << i << ' ';
        cout << '\n';
        return 0;
    }
    for (int i = 1; i <= n; ++i){
        gen(i, 0, INF, INF, 0, tree(1, 0, 0));
        for (int s = 0; s <= n * (n + 1) / 2; ++s){
            for (int p = 0; p <= (n - 1) * n * (n + 1) / 6; ++p){
                if (dp[i][s][p] != 0)
                    pos[i].emplace_back(tree(i, s, p));
            }
        }
    }
    for (int i = 1; i <= m; ++i){
        long long sum = 0;
        for (int s = 0; s <= n * (n + 1) / 2; ++s)
            sum += dp[n][s][i];
    }
}

```

```
        cout << sum % MOD << '␣';  
    }  
    cout << '\n';  
    return 0;  
}
```