

Олимпиада СПбГУ по информатике 2019/20 учебного года

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

Task A ()

```
// #define _GLIBCXX_DEBUG

#include <bits/stdc++.h>

#define int ll
// #define _int128_t ll
#define f first
#define s second
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define sort stable_sort
#define push push_back
#define out cout << fixed << setprecision(15)

using namespace std;

typedef long long ll;
typedef long double ld;

const int MAXN = 1e5 + 1, INF = 1e9 + 1, M = 1e9 + 7;

signed main() {
    #ifdef _GLIBCXX_DEBUG
        freopen("in.txt", "r", stdin);
        freopen("out.txt", "w", stdout);
    #endif
    int n;
    cin >> n;
    if (n % 2) {
        cout << n / 2 + n / 2;
    } else {
        cout << n - 1;
    }
    return 0;
}
```

Task B ()

```
// #define _GLIBCXX_DEBUG

#include <bits/stdc++.h>

#define int ll
// #define _int128_t ll
#define f first
#define s second
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define sort stable_sort
#define push push_back
#define out cout << fixed << setprecision(15)

using namespace std;

typedef long long ll;
typedef long double ld;

const int MAXN = 1e5 + 1, INF = 1e9 + 1, M = 1e9 + 7;
const ld EPS = 0.0019;

signed main() {
    #ifdef _GLIBCXX_DEBUG
        freopen("in.txt", "r", stdin);
        // freopen("out.txt", "w", stdout);
    #endif
    int n;
    cin >> n;
    if (n == 6) {
        vector <pair <ld, ld>> v(n);
        for (int i = 0; i < n; ++i) {
            cin >> v[i].f >> v[i].s;
        }
        ld mn = INF;
        for (int i = 1; i < n; ++i) {
            mn = min(hypot(v[i].f - v[0].f, v[i].s - v[0].s), mn);
        }
        // cerr << mn << endl;
        vector <int> used(n);
        vector <pair <ld, ld>> ans {v[0]};
        used[0] = 1;
        for (; ans.size() < 6;) {
            for (int j = 0; j < n; ++j) {
                if (!used[j]) {
                    if (abs(hypot(ans.back().f - v[j].f, ans.back().s - v[j].s) - mn) < EPS) {
                        ans.push(v[j]);
                        used[j] = 1;
                        break;
                    }
                }
            }
        }
        // cout << ans.size() << endl;
        for (int i = 0; i < n; i += 2) {
            out << ans[i].f << ' ' << ans[i].s << endl;
        }
        return 0;
    }
    pair <ld, ld> a[9];
    cin >> a[0].f >> a[0].s >> a[2].f >> a[2].s >> a[4].f >> a[4].s;
    ld d = hypot(a[0].f - a[2].f, a[0].s - a[2].s);
    for (int i = 0; i < 6; i += 2) {
        ld x = a[(i + 2) % 6].f + a[(i + 4) % 6].f - 2 * a[i].f;
        ld y = a[(i + 2) % 6].s + a[(i + 4) % 6].s - 2 * a[i].s;
        a[(i + 3) % 6].f = 2 * x / 3 + a[i].f;
        a[(i + 3) % 6].s = 2 * y / 3 + a[i].s;
    }
}
```

```
for (int i = 0; i < 6; ++i) {  
    out << a[i].f << '␣' << a[i].s << '\n';  
}  
return 0;  
}
```

Task C ()

```
// #define _GLIBCXX_DEBUG

#include <bits/stdc++.h>

#define int ll
// #define _int128_t ll
#define f first
#define s second
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define sort stable_sort
#define push push_back
#define out cout << fixed << setprecision(15)

using namespace std;

typedef long long ll;
typedef long double ld;

const int MAXN = 1e5 + 1, INF = 1e9 + 1, M = 1e9 + 7;

signed main() {
    #ifdef _GLIBCXX_DEBUG
        freopen("in.txt", "r", stdin);
        freopen("out.txt", "w", stdout);
    #endif
    string t;
    int n;
    cin >> t >> n;
    int len = t.size();
    int ans = 0;
    for (; n--;) {
        string s;
        cin >> s;
        int mx = 0;
        for (int i = 0; i < s.size(); ++i) {
            int l = 0;
            int cnt = 0;
            for (int j = 0; i + j < s.size(); ++j) {
                for (; l < len && s[i + j] != t[l];) {
                    ++l;
                }
                if (s[i + j] == t[l]) {
                    ++cnt;
                    ++l;
                }
            }
            mx = max(mx, cnt);
        }
        // cout << len - mx << endl;
        ans += len - mx;
    }
    cout << ans;
    return 0;
}
```

Task D ()

```
// #define _GLIBCXX_DEBUG

#include <bits/stdc++.h>

// #define int ll
// #define _int128_t ll
#define f first
#define s second
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define sort stable_sort
#define push push_back
#define out cout << fixed << setprecision(15)

#pragma GCC optimize("O3")
#pragma GCC optimize("unroll-loops")

using namespace std;

typedef long long ll;
typedef long double ld;

const int MAXN = 1002, INF = 1e9 + 1, M = 1e9 + 7;

int n, m;
int x[MAXN][MAXN], y[MAXN][MAXN], d[MAXN][MAXN], used[MAXN][MAXN];

inline bool corr(int i, int j) {
    return i > 0 && i <= n && j > 0 && j <= m;
}

signed main() {
    #ifdef _GLIBCXX_DEBUG
        freopen("in.txt", "r", stdin);
        // freopen("out.txt", "w", stdout);
    #endif
    int xs, ys, xf, yf;
    cin >> n >> m >> xs >> ys >> xf >> yf;
    for (int i = 1; i <= n; ++i) {
        for (int j = 1; j <= m; ++j) {
            cin >> x[i][j] >> y[i][j];
            d[i][j] = INF;
        }
    }
    d[xs][ys] = 0;
    vector<pair<int, int>> q(MAXN * MAXN * 21);
    int sz = 0;
    for (int i = 2; i > -3; --i) {
        for (int j = -2; j < 3; ++j) {
            if (!corr(xs + i, ys + j)) {
                continue;
            }
            if (d[xs + i][ys + j] > d[xs][ys] + abs(i - x[xs][ys]) + abs(j - y[xs][ys])) {
                d[xs + i][ys + j] = d[xs][ys] + abs(i - x[xs][ys]) + abs(j - y[xs][ys]);
                q[sz++] = {xs + i, ys + j};
                used[xs + i][ys + j] = 1;
            }
        }
    }
    for (int k = 0; k < sz; ++k) {
        xs = q[k].f;
        ys = q[k].s;
        for (int i = 2; i > -3; --i) {
            for (int j = 2; j > -3; --j) {
                if (!corr(xs + i, ys + j)) {
                    continue;
                }
                int mn = min(abs(i - x[xs][ys]) + abs(j - y[xs][ys]), abs(i) + abs(j));
                if (d[xs + i][ys + j] > d[xs][ys] + mn) {
```

```

        d[xs + i][ys + j] = d[xs][ys] + mn;
        if (!used[xs + i][ys + j]) {
            q[sz++] = {xs + i, ys + j};
            used[xs + i][ys + j] = 1;
        }
    }
    used[xs][ys] = 0;
}
cout << d[xf][yf] << '\n';
return 0;
}

```

Task E ()

```
// #define _GLIBCXX_DEBUG

#include <bits/stdc++.h>

#define int ll
// #define _int128_t ll
#define f first
#define s second
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define sort stable_sort
#define push push_back
#define out cout << fixed << setprecision(15)

using namespace std;

typedef long long ll;
typedef long double ld;

const int MAXN = 1e5 + 1, INF = 1e9 + 1, M = 1e9 + 7;

signed main() {
    #ifdef _GLIBCXX_DEBUG
        freopen("in.txt", "r", stdin);
        // freopen("out.txt", "w", stdout);
    #endif
    int a, b, n;
    cin >> a >> b >> n;
    vector<pair<int, int>> v(n);
    for (auto &i: v) {
        cin >> i.f >> i.s;
    }
    vector<int> used(MAXN);
    map<pair<ll, ll>, ll> m;
    map<ll, pair<ll, ll>> crd;
    for (int i = 0; i < (1 << n); ++i) {
        m[{a * i + i * i, b * i + i * i}] = i;
        crd[i] = {a * i + i * i, b * i + i * i};
        // cerr << a * i + i * i << ' ' << b * i + i * i << endl;
    }
    for (int i = n; i > 0; --i) {
        int cnt = 0;
        ll f, s;
        for (int k = 0; cnt <= (1 << i) && k < (1 << n); ++k) {
            if (!used[k]) {
                ++cnt;
                m[{crd[k].f + v[i - 1].f, crd[k].s + v[i - 1].s}] = k;
                if (cnt && cnt % 2 == 0) {
                    cout << "?_ " << f << '_ ' << s << '_ ' << crd[k].f + v[i - 1].f << '_ ' << crd[k].s + v[i - 1].s << endl;
                    ll a, b;
                    cin >> a >> b;
                    used[m[{a, b}]] = 1;
                } else {
                    f = crd[k].f + v[i - 1].f;
                    s = crd[k].s + v[i - 1].s;
                }
            }
        }
    }
    for (int k = 0; k < (1 << n); ++k) {
        if (!used[k]) {
            cout << "!_ " << crd[k].f + 1 << '_ ' << crd[k].s + 1;
            return 0;
        }
    }
    return 0;
}
```

Task F ()

```
// #define _GLIBCXX_DEBUG

#include <bits/stdc++.h>

#define int ll
// #define _int128_t ll
#define f first
#define s second
#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()
#define sort stable_sort
#define push push_back
#define out cout << fixed << setprecision(15)

using namespace std;

typedef long long ll;
typedef long double ld;

const int MAXN = 1e5 + 1, INF = 1e9 + 1, M = 1e9 + 7;

vector<vector<int>> v {{}, {}, {1}, {0, 0, 0, 3}, {0, 0, 0, 0, 0, 0, 0, 0, 4, 12}, {0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 65, 0, 120, 0, 60}};

signed main() {
    #ifdef _GLIBCXX_DEBUG
        freopen("in.txt", "r", stdin);
        // freopen("out.txt", "w", stdout);
    #endif
    int n, m;
    cin >> n >> m;
    for (int i: v[n]) {
        cout << i << '␣';
    }
    return 0;
}
```