

Олимпиада «Ломоносов» по информатике  
2024-2025 учебный год. Заключительный этап  
Работа участника с id заявки 1443461, логином inf25f\_374

Сводный итог по всем задачам в проверяющей системе

RunID	Time	Username	Prob	Lang	Result	Tests	Score
366	3:58:53	inf25f_374	4	g++	Partial	solution 1	0
307	3:47:22	inf25f_374	3	g++	Partial	solution 10	35
186	2:47:48	inf25f_374	5	g++	OK	11	100
76	1:12:22	inf25f_374	1	g++	OK	29	100
51	0:56:22	inf25f_374	2	g++	OK	28	100

335 технических баллов

96 итоговых баллов

## Посылка по задаче 1

```
[1] #include <iostream>
[2] #include <algorithm>
[3] #include <vector>
[4]
[5] using namespace std;
[6] typedef long long ll;
[7]
[8] int main()
[9] {
[10]     ll n1, n2;
[11]     cin >> n1 >> n2;
[12]     bool base = 0;
[13]     if (n1 == 1 or n2 == 1) base = 1;
[14]     if (n1 == n2) {
[15]         cout << 0;
[16]         return 0;
[17]     }
[18]     if (n1 == 4 and n2 == 1) {
[19]         cout << 1;
[20]         return 0;
[21]     }
[22]     if (n1 == 1 and n2 == 4) {
[23]         cout << 1;
[24]         return 0;
[25]     }
[26]     vector<ll> p1, p2;
[27]     while (n1 != 1) {
[28]         p1.push_back(n1);
[29]         if (n1 % 2 == 0) n1 /= 2;
[30]         else n1 = n1 * 3 + 1;
[31]     }
[32]     while (n2 != 1) {
[33]         p2.push_back(n2);
[34]         if (n2 % 2 == 0) n2 /= 2;
[35]         else n2 = n2 * 3 + 1;
[36]     }
[37]     p1.push_back(1);
[38]     p2.push_back(1);
[39]     reverse(p1.begin(), p1.end());
[40]     reverse(p2.begin(), p2.end());
[41]     vector<ll> ans;
[42]     ll now = 0;
[43]     while(p1[now] == p2[now]) {
[44]         now++;
[45]         if (now == p1.size() or now == p2.size()) break;
[46]     }
[47]     if (now == p1.size() or now == p2.size()) {
[48]         if (now == p1.size()) {
[49]             for (ll i = now; i < p2.size() - 1; ++i) {
[50]                 ans.push_back(p2[i]);
[51]             }
[52]         }
[53]         else {
[54]             for (ll i = p1.size() - 2; i >= now; --i) {
[55]                 ans.push_back(p1[i]);
[56]             }
[57]         }
[58]     }
[59]     else {
[60]         for (ll i = p1.size() - 2; i >= now - 1; --i) {
[61]             ans.push_back(p1[i]);
[62]         }
[63]         for (ll i = now; i < p2.size() - 1; ++i) {
[64]             ans.push_back(p2[i]);
[65]         }
[66]     }
[67]     bool f2 = 0, f4 = 0;
[68]     for (ll i = 0; i < ans.size(); ++i) {
[69]         if (ans[i] == 2) f2 = 1;
[70]         if (ans[i] == 4) f4 = 1;
[71]     }
[72]     if (base and f2 and f4) {
[73]         cout << ans.size() << '\n';
[74]         for (ll i = 0; i < ans.size(); ++i) {
[75]             if (ans[i] != 2) {
[76]                 cout << ans[i] << ' ';
[77]             }
[78]         }
[79]     }
[80]     else {
[81]         cout << ans.size() + 1 << '\n';
[82]         for (ll i = 0; i < ans.size(); ++i) cout << ans[i] << ' ';
[83]     }
[84]     return 0;
[85] }
```

## Посылка по задаче 2

```
[1] #include <iostream>
[2] #include <vector>
[3]
[4] using namespace std;
[5] typedef long long ll;
[6]
[7] int main()
[8] {
[9]     ll n;
[10]    cin >> n;
[11]    vector<ll> v(n);
[12]    for (ll j = 0; j < n; ++j) {
[13]        string s;
[14]        cin >> s;
[15]        ll mcr = 0;
[16]        for (ll i = 0; i < s.size(); ++i) {
[17]            ll now = s[i] - 'a';
[18]            if (now >= 0) now += 26;
[19]            else now = s[i] - 'A';
[20]            bool f = 1;
[21]            if (i != s.size() - 1) {
[22]                if (s[i + 1] == '^') {
[23]                    now += 52;
[24]                    f = 0;
[25]                }
[26]                if (s[i + 1] == '~') {
[27]                    now += 52 * 2;
[28]                    f = 0;
[29]                }
[30]                if (s[i + 1] == '_') {
[31]                    now += 52 * 3;
[32]                    f = 0;
[33]                }
[34]            }
[35]            if (!f) i++;
[36]            mcr *= 52;
[37]            mcr += now;
[38]        }
[39]        v[j] = mcr;
[40]    }
[41]    ll f = -1, s = -1;
[42]    for (ll i = 0; i < n - 1; ++i) {
[43]        if (v[i] < v[i + 1]) {
[44]            if (f == -1) f = i;
[45]            else s = i + 1;
[46]        }
[47]    }
[48]    if (s == -1) s = f + 1;
[49]    cout << f + 1 << ' ' << s + 1;
[50]    return 0;
[51] }
```

### Посылка по задаче 3

```
[1] #include <iostream>
[2] #include <vector>
[3] #include <set>
[4] #include <algorithm>
[5]
[6] using namespace std;
[7] typedef long long ll;
[8]
[9] ll maxx = 0;
[10] ll t;
[11] vector<ll> c;
[12] vector<vector<pair<ll, ll>>> v;
[13] vector<vector<ll>> bp;
[14]
[15] void p(ll i, ll nnows, ll nowt, vector<ll>& used, vector<ll> &myp) {
[16]     used[i]++;
[17]     myp.push_back(i);
[18]     ll nnows = nnows;
[19]     if (used[i] == 1) nnows += c[i];
[20]     if (i == 0) {
[21]         if (maxxx <= nnows) {
[22]             if (nnows > maxx) {
[23]                 while(bp.size() > 0) {
[24]                     bp.pop_back();
[25]                 }
[26]             }
[27]             bp.push_back(myp);
[28]             maxx = nnows;
[29]         }
[30]     }
[31]     for (auto &j:v[i]) {
[32]         if (nowt + j.second <= t) {
[33]             p(j.first, nnows, nowt + j.second, used, myp);
[34]         }
[35]     }
[36]     used[i]--;
[37]     myp.pop_back();
[38] }
[39]
[40] int main()
[41] {
[42]     ll n, tt, m;
[43]     cin >> n >> tt >> m;
[44]     t = tt;
[45]     v = vector<vector<pair<ll, ll>>> (n);
[46]     bp = vector<vector<ll>>(0);
[47]     c = vector<ll> (n);
[48]     for (ll i = 0; i < n; ++i) cin >> c[i];
[49]     vector<vector<ll>> matr(n, vector<ll> (n));
[50]     for (ll i = 0; i < n; ++i) {
[51]         for (ll j = 0; j < n; ++j) {
[52]             cin >> matr[i][j];
[53]         }
[54]     }
```

```

[55]     for (ll i = 0; i < m; ++i) {
[56]         ll a, b, d;
[57]         cin >> a >> b >> d;
[58]         a--, b--;
[59]         matr[a][b] = min(matr[a][b], d);
[60]     }
[61]     for (ll i = 0; i < n; ++i) {
[62]         for (ll j = 0; j < n; ++j) {
[63]             if (i != j) {
[64]                 v[i].push_back({j, matr[i][j]});
[65]                 v[j].push_back({i, matr[i][j]});
[66]             }
[67]         }
[68]     }
[69]     vector<ll> used(n, 0);
[70]     vector<ll> myp(0);
[71]     p(0, 0, 0, used, myp);
[72]     ll minn = 4 * 1e18;
[73]     for (ll i = 0; i < bp.size(); ++i) {
[74]         vector<ll> un(0);
[75]         set<ll> h;
[76]         for (ll j = 0; j < bp[i].size(); ++j) {
[77]             if (h.find(bp[i][j]) == h.end()) {
[78]                 un.push_back(bp[i][j]);
[79]                 h.insert(bp[i][j]);
[80]             }
[81]         }
[82]         minn = min(ll(un.size()), minn);
[83]         bp[i] = un;
[84]     }
[85]     vector<vector<ll>> bbp;
[86]     for (ll i = 0; i < bp.size(); ++i) {
[87]         if (bp[i].size() == minn) bbp.push_back(bp[i]);
[88]     }
[89]     sort(bbp.begin(), bbp.end());
[90]     cout << bbp[0].size() << '\n';
[91]     for (ll i = 0; i < bbp[0].size() - 1; ++i) cout << bbp[0][i] + 1 << ' ';
[92]     cout << bbp[0][bbp[0].size() - 1] + 1;
[93]     return 0;
[94] }

```

## Посылка по задаче 4

```
[1] #include <bits/stdc++.h>
[2] using namespace std;
[3]
[4] typedef std::string Atom;
[5] bool small(const char& a) {
[6]     return 'a' <= a && a <= 'z';
[7] }
[8]
[9] bool big(const char& a) {
[10]     return 'A' <= a && a <= 'Z';
[11] }
[12]
[13] bool num(const char& a) {
[14]     return '0' <= a && a <= '9';
[15] }
[16]
[17] class Molecula {
[18] public:
[19]     Molecula() = default;
[20]     Molecula(const std::string&, const int&);
[21]     explicit Molecula(const std::string&);
[22]     bool operator==(const Molecula&) const;
[23]     bool operator<(const Molecula&) const;
[24]     Molecula& operator+=(const Molecula&);
[25]     Molecula operator+(Molecula) const;
[26]
[27]     int operator[](const Atom&) const;
[28]     map<Atom, int> difference(const Molecula&); // returns elements whi
[29]
[30]     int pos;
[31] private:
[32]     std::string seq;
[33]     std::map<Atom, int> amount;
[34] };
[35]
[36] Molecula::Molecula(const std::string& a, const int& pos): Molecula(a){
[37]     this->pos = pos;
[38] };
[39]
[40] Molecula Molecula::operator+(Molecula other) const {
[41]     other += *this;
[42]     return other;
[43] }
[44]
[45] int Molecula::operator[](const Atom& at) const {
[46]     return amount.at(at);
[47] }
[48] map<Atom, int> Molecula::difference(const Molecula& other) {
[49]     map<Atom, int> res;
[50]     for (auto & [at, am] : other.amount) {
[51]         if (!this->amount.count(at)) {
[52]             res[at] = am;
[53]         }
[54]     }
[55]     return res;
[56] }
[57]
[58] Molecula::Molecula(const std::string& a) {
[59]     int i = 0;
[60]     int k = 0;
[61]     for (; num(a[i]); ++i) {
[62]         k *= 10;
[63]         k += a[i] - '0';
[64]     }
[65]
[66]     stack<std::map<Atom, int>> lcl; // locale amount
[67]     lcl.push({});
[68]     Atom nw;
[69]     int nm = 0;
[70]     for (; i < a.size(); ++i) {
[71]         if (big(a[i])) {
[72]             lcl.top()[nw] = nm;
[73]             nm = 0;
[74]             nw.clear();
[75]         } else if (small(a[i])) {
[76]
[77]         } else if (num(a[i])) {
[78]             nm *= 10;
[79]             nm += a[i] - '0';
[80]         } else if (a[i] == '(' || a[i] == '[') {
[81]             lcl.push({});
[82]         } else if (a[i] == ')' || a[i] == ']') {
[83]             nm = 0;
[84]             ++i;
```

```

[85]         for (; num(a[i]); ++i) {
[86]             nm *= 10;
[87]             nm += a[i] - '0';
[88]         }
[89]         auto e = lcl.top();
[90]         lcl.pop();
[91]         for (auto & [at, m] : e) {
[92]             lcl.top()[at] += m * nm;
[93]         }
[94]         nm = 0;
[95]     }
[96] }
[97] for (auto & [at, m] : lcl.top()) {
[98]     m *= k;
[99] }
[100] amount = lcl.top();
[101] }
[102]
[103] bool Molecula::operator==(const Molecula& other) const {
[104]     return this->amount == other.amount;
[105] }
[106]
[107]
[108] Molecula& Molecula::operator+=(const Molecula& other) {
[109]     for (auto & [at, am] : other.amount) {
[110]         this->amount[at] += am;
[111]     }
[112]     return *this;
[113] }
[114]
[115] bool in(const Atom& a, const Molecula& m) {
[116]     return m[a] >= 0;
[117] }
[118]
[119] bool Molecula::operator<(const Molecula& other) const {
[120]     return this->seq < other.seq;
[121] }
[122]
[123] int main() {
[124]     string formula;
[125]     while (cin >> formula) {
[126]         int pos = 0;
[127]         set<Molecula> left, right;
[128]         int i = 0;
[129]         string nw;
[130]         for (; formula[i] != '='; ++i) {
[131]             if (formula[i] == '+') {
[132]                 left.insert(Molecula(nw, ++pos));
[133]                 nw.clear();
[134]             } else {
[135]                 nw += formula[i];
[136]             }
[137]         }
[138]         left.insert(Molecula(nw, ++pos));
[139]         pos = 0;
[140]         nw.clear();
[141]         for (; i < formula.size(); ++i) {
[142]             if (formula[i] == '+') {
[143]                 right.insert(Molecula(nw, ++pos));
[144]                 nw.clear();
[145]             } else {
[146]                 nw += formula[i];
[147]             }
[148]         }
[149]         right.insert(Molecula(nw, ++pos));
[150]         Molecula leftSum, rightSum;
[151]         for (auto & m : left) {
[152]             leftSum += m;
[153]         }
[154]         for (auto & m : right) {
[155]             rightSum += m;
[156]         }
[157]
[158]         auto diffL = leftSum.difference(rightSum);
[159]         auto diffR = rightSum.difference(leftSum);
[160]
[161]
[162]     }
[163] }

```

## Посылка по задаче 5

```
[1] #include <iostream>
[2] #include <algorithm>
[3] #include <set>
[4] #include <vector>
[5]
[6] using namespace std;
[7] typedef int ll;
[8]
[9] signed main()
[10] {
[11]     ll m, n, k;
[12]     cin >> m >> n >> k;
[13]     vector<pair<ll, ll>> v(n, {-1, -1});
[14]     for (ll i = 0; i < n - 1; ++i) {
[15]         ll s, d, b;
[16]         cin >> s >> d >> b;
[17]         s--, d--;
[18]         v[d] = {s, b};
[19]     }
[20]     for (ll be = 0; be < k; ++be) {
[21]         ll f, s;
[22]         cin >> f >> s;
[23]         f--, s--;
[24]         if (f == s) {
[25]             cout << m << '\n';
[26]             continue;
[27]         }
[28]         vector<pair<ll, ll>> p1(0), p2(0);
[29]         ll now = f;
[30]         while (now != 0) {
[31]             p1.push_back(v[now]);
[32]             now = v[now].first;
[33]         }
[34]         now = s;
[35]         while (now != 0) {
[36]             p2.push_back(v[now]);
[37]             now = v[now].first;
[38]         }
[39]         reverse(p1.begin(), p1.end());
[40]         reverse(p2.begin(), p2.end());
[41]         if (p1.size() > p2.size()) swap(p1, p2);
[42]         now = 0;
[43]         while (1) {
[44]             if (now == p1.size()) break;
[45]             if (p1[now].first != p2[now].first or p1[now].second != p2[now].second) break;
[46]             now++;
[47]         }
[48]         set<ll> h;
[49]         vector<ll> un;
[50]         if (now == p1.size()) {
[51]             for (ll i = now; i < p2.size(); ++i) {
[52]                 if (h.find(p2[i].second) == h.end()) {
[53]                     h.insert(p2[i].second);
[54]                     un.push_back(p2[i].second);
[55]                 }
[56]             }
[57]         }
[58]         else {
[59]             for (ll i = now; i < p1.size(); ++i) {
[60]                 if (h.find(p1[i].second) == h.end()) {
[61]                     h.insert(p1[i].second);
[62]                     un.push_back(p1[i].second);
[63]                 }
[64]             }
[65]             for (ll i = now; i < p2.size(); ++i) {
[66]                 if (h.find(p2[i].second) == h.end()) {
[67]                     h.insert(p2[i].second);
[68]                     un.push_back(p2[i].second);
[69]                 }
[70]             }
[71]         }
[72]         sort(un.begin(), un.end());
[73]         ll last = -1;
[74]         ll maxx = 0;
[75]         for (ll i = 0; i < un.size(); ++i) {
[76]             maxx = max(maxx, un[i] - last - 1);
[77]             last = un[i];
[78]         }
[79]         maxx = max(maxx, m - last - 1);
[80]         cout << maxx << '\n';
[81]     }
[82]     return 0;
[83] }
```