

Олимпиада «Ломоносов» по информатике
2023-2024 учебный год. Заключительный тур
Работа участника с id заявки 1264834, логином inf24f_201

Сводный итог по всем задачам в проверяющей системе

Run ID	Time	User name	Problem	Language	Result	Tests	Score
29	0:15:53	inf24f_201	1	g++	OK	28	100
496	3:17:36	inf24f_201	2	python3	Partial solution	16	52
369	2:26:53	inf24f_201	3	python3	Partial solution	27	96
254	1:44:01	inf24f_201	4	g++	Partial solution	7	30
424	2:49:23	inf24f_201	5	g++	OK	22	100
635	3:52:21	inf24f_201	6	g++	Partial solution	2	10
388 технических баллов							
64 итоговых балла							

Посылка по задаче 1

```
[1] #include <iostream>
[2] #include <vector>
[3] #include <algorithm>
[4] #include <string>
[5] using namespace std;
[6] ostream& operator<< (ostream& stream, const pair<int, int>& a) {
[7]     stream << "{" << a.first << ", " << a.second << "}";
[8]     return stream;
[9] }
[10]
[11] ostream& operator<< (ostream& stream, const vector<int>& a) {
[12]     for (auto x : a) {
[13]         stream << x << " ";
[14]     }
[15]     return stream;
[16] }
[17]
[18] ostream& operator<< (ostream& stream, const vector<pair<int, int>>& a) {
[19]     for (auto x : a) {
[20]         stream << x << " ";
[21]     }
[22]     return stream;
[23] }
[24]
[25] ostream& operator<< (ostream& stream, const pair<long long, long long>& a) {
[26]     stream << "{" << a.first << ", " << a.second << "}";
[27]     return stream;
[28] }
[29]
[30] ostream& operator<< (ostream& stream, const vector<long long>& a) {
[31]     for (auto x : a) {
[32]         stream << x << " ";
[33]     }
[34]     return stream;
[35] }
[36]
[37] ostream& operator<< (ostream& stream, const vector<pair<long long, long long>>& a) {
[38]     for (auto x : a) {
[39]         stream << x << " ";
[40]     }
[41]     return stream;
[42] }
[43]
[44]
[45]
[46]
[47]
[48]
[49]
[50]
```

```

[51]
[52]
[53]
[54]
[55]
[56] const int sz = 50;
[57]
[58] void solve() {
[59]     vector<long long> T(sz);
[60]     T[0] = T[1] = T[2] = 0;
[61]     T[3] = 1;
[62]     for (int i = 4; i < sz; i++) {
[63]         T[i] = T[i - 1] + T[i - 2] + T[i - 3] + T[i - 4];
[64]     }
[65]     int n;
[66]     cin >> n;
[67]     vector<long long> a(n);
[68]     for (int i = 0; i < n; i++) {
[69]         cin >> a[i];
[70]     }
[71]     int ans = 0;
[72]     for (auto w : a) {
[73]         long long x = w;
[74]         int c = 0;
[75]         while (x > 0) {
[76]             for (int i = sz - 1; i >= 0; i--) {
[77]                 if (x - T[i] >= 0) {
[78]                     x -= T[i];
[79]                     c++;
[80]                     break;
[81]                 }
[82]             }
[83]         }
[84]         ans += (c % 2 == 0);
[85]     }
[86]     cout << ans;
[87] }
[88]
[89]
[90] int main() {
[91]
[92]
[93]     solve();
[94]
[95] }

```

Посылка по задаче 2

```
[1] alp = [x for x in "PWROYGCBVD"]
[2] alp.sort()
[3] d = {}
[4] for x in alp:
[5]     d[x] = 0
[6]
[7] sz = 4690
[8]
[9] pows = [0] * sz
[10] pows[0] = 1
[11] for i in range(1, sz):
[12]     pows[i] = pows[i - 1] * 0.5
[13]
[14] def tr(x):
[15]     if x == 1:
[16]         return "1.0"
[17]     if x == 0:
[18]         return "0.0"
[19]     i = 1
[20]     res = "0."
[21]     while x > 0:
[22]         if x - pows[i] >= 0:
[23]             x -= pows[i]
[24]             res += "1"
[25]         else:
[26]             res += "0"
[27]         i += 1
[28]     return res
[29]
[30]
[31]
[32] def rec(idx, V):
[33]     global s
[34]     res = [idx]
[35]     for i in range(8):
[36]         if s[idx] == "Q":
[37]             idx = rec(idx + 1, V / 8)
[38]         else:
[39]             d[s[idx]] += V
[40]             idx += 1
[41]     res.append(idx)
[42]     return idx
[43]
[44]
[45] s = input()
[46] mx = -1
[47] v = "NULL"
[48] if len(s) == 1:
[49]     v = s[0]
[50]     mx = 1
[51] else:
[52]     rec(1, 1 / 8)
[53]     for key, value in d.items():
[54]         if value > mx:
[55]             mx = value
[56]             v = key
[57] print(v)
[58] print(tr(mx))
[59] #0123456789 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
[60] #QQDWWWWWWW Q W D W W W W W W D D W W W W
```

Посылка по задаче 3

```
[1] sim = ["()", "i", "i(", "i((", "I", "I(", "I((", "J", "J)", "J))", "j", "j)", "j))"]
[2] d = {}
[3] for i in range(13):
[4]     d[sim[i]] = i
[5]
[6] pows = [0] * 200
[7] pows[0] = 1
[8] for i in range(1, 200):
[9]     pows[i] = pows[i - 1] * 12
[10]
[11] def to_num(s):
[12]     n = len(s)
[13]     i = 0
[14]     res = []
[15]     cur = ""
[16]     while i < n:
[17]         cur += s[i]
[18]         while i + 1 < n and (cur + s[i + 1]) in d:
[19]             cur += s[i + 1]
[20]             i += 1
[21]         i += 1
[22]         if cur not in d:
[23]             continue
[24]         res.append(d[cur])
[25]         cur = ""
[26]     sz = len(res)
[27]     val = 0
[28]     for i in range(sz):
[29]         val += res[i] * pows[i]
[30]     return val
[31]
[32] def to_str(x):
[33]     if x == 0:
[34]         return "[]"
[35]     sz = 101
[36]     res = [-1] * sz
[37]     for i in range(sz - 1, -1, -1):
[38]         for w in range(12, 0, -1):
[39]             if x - w * pows[i] == 0 and i != 0:
[40]                 continue
[41]             if x - w * pows[i] >= 0:
[42]                 x -= w * pows[i]
[43]                 res[i] = w
[44]                 break
[45]     s = ""
[46]     idx = 0
[47]     while res[idx] != -1:
[48]         s += sim[res[idx]]
[49]         idx += 1
[50]     return s
[51]
[52] def solve():
[53]
[54]     n = int(input())
[55]     a = [0] * n
[56]
[57]     delta = 0
[58]     ans = [-1, -1]
[59]
[60]     for i in range(n):
[61]         a[i] = to_num(input())
[62]
[63]     for i in range(n):
[64]         for j in range(i + 1, n):
[65]             res = abs(a[i] - a[j])
[66]             if res > delta:
[67]                 delta = res
[68]                 ans = [i, j]
[69]             if res == delta and ans[0] + ans[1] < i + j:
[70]                 ans = [i, j]
[71]
[72]     print(to_str(ans[0] + 1))
[73]     print(to_str(ans[1] + 1))
[74]
[75]
[76] solve()
```

Посылка по задаче 4

```
[1] #include <iostream>
[2] #include <vector>
[3] #include <algorithm>
[4] #include <string>
[5] #include <set>
[6] using namespace std;
[7] ostream& operator<< (ostream& stream, const pair<int, int>& a) {
[8]     stream << "{" << a.first << ", " << a.second << "}";
[9]     return stream;
[10] }
[11]
[12] ostream& operator<< (ostream& stream, const vector<int>& a) {
[13]     for (auto x : a) {
[14]         stream << x << " ";
[15]     }
[16]     return stream;
[17] }
[18]
[19] ostream& operator<< (ostream& stream, const vector<pair<int, int>>& a) {
[20]     for (auto x : a) {
[21]         stream << x << " ";
[22]     }
[23]     return stream;
[24] }
[25]
[26] ostream& operator<< (ostream& stream, const pair<long long, long long>& a) {
[27]     stream << "{" << a.first << ", " << a.second << "}";
[28]     return stream;
[29] }
[30]
[31] ostream& operator<< (ostream& stream, const vector<long long>& a) {
[32]     for (auto x : a) {
[33]         stream << x << " ";
[34]     }
[35]     return stream;
[36] }
[37]
[38] ostream& operator<< (ostream& stream, const vector<pair<long long, long long>>& a) {
[39]     for (auto x : a) {
[40]         stream << x << " ";
[41]     }
[42]     return stream;
[43] }
[44]
[45]
[46]
[47]
[48]
[49]
[50]
[51] const int maxn = 20;
[52] const int maxm = 200;
[53]
[54] long long dp[maxn][maxn][maxn][maxm];
[55]
[56]
[57]
[58]
[59]
```

```

[60] int cnt(int mask, int sz) {
[61]     int c = 0;
[62]     for (int i = 0; i < sz; i++) {
[63]         if ((mask >> i) & 1) {
[64]             c++;
[65]         }
[66]     }
[67]     return c;
[68] }
[69]
[70] int main() {
[71]     int n, m;
[72]     cin >> n >> m;
[73]     int i1, i2, i3;
[74]     cin >> i1 >> i2 >> i3;
[75]     vector<vector<long long>>> a(n, vector<long long>(m));
[76]     for (int i = 0; i < n; i++) {
[77]         for (int j = 0; j < m; j++) {
[78]             cin >> a[i][j];
[79]         }
[80]     }
[81]     dp[i1][i2][i3][0] = a[i1][0] + a[i2][0] + a[i3][0];
[82]     for (int j = 1; j < m; j++) {
[83]         for (int i1 = 0; i1 < n; i1++) {
[84]             for (int i2 = 0; i2 < n; i2++) {
[85]                 for (int i3 = 0; i3 < n; i3++) {
[86]                     set<int> pos;
[87]                     pos.insert(i1);
[88]                     pos.insert(i2);
[89]                     pos.insert(i3);
[90]                     long long delta = 0;
[91]                     for (auto p : pos) {
[92]                         delta += a[p][j];
[93]                     }
[94]                     for (int p_i1 = i1 - 1; p_i1 <= i1 + 1; p_i1++) {
[95]                         if (p_i1 >= n || p_i1 < 0) {
[96]                             continue;
[97]                         }
[98]                         for (int p_i2 = i2 - 1; p_i2 <= i2 + 1; p_i2++) {
[99]                             if (p_i2 >= n || p_i2 < 0) {
[100]                                 continue;
[101]                             }
[102]                             for (int p_i3 = i3 - 1; p_i3 <= i3 + 1; p_i3++) {
[103]                                 if (p_i3 >= n || p_i3 < 0) {
[104]                                     continue;
[105]                                 }
[106]                                 dp[i1][i2][i3][j] = max(dp[i1][i2][i3][j], dp[p_i1][p_i2][p_i3][j -
[107] 1] + delta);
[108]                             }
[109]                         }
[110]                     }
[111]                 }
[112]             }
[113]         }
[114]     }
[115]     long long mx = 0;
[116]     for (int i1 = 0; i1 < n; i1++) {
[117]         for (int i2 = 0; i2 < n; i2++) {
[118]             for (int i3 = 0; i3 < n; i3++) {
[119]                 mx = max(mx, dp[i1][i2][i3][m - 1]);
[120]             }
[121]         }
[122]     }
[123]     cout << mx;
[124] }

```

Посылка по задаче 5

```
[1] #include <iostream>
[2] #include <vector>
[3] #include <algorithm>
[4] #include <set>
[5] #include <string>
[6] using namespace std;
[7] ostream& operator<< (ostream& stream, const pair<int, int>& a) {
[8]     stream << "{" << a.first << ", " << a.second << "}";
[9]     return stream;
[10] }
[11]
[12] ostream& operator<< (ostream& stream, const vector<int>& a) {
[13]     for (auto x : a) {
[14]         stream << x << " ";
[15]     }
[16]     return stream;
[17] }
[18]
[19] ostream& operator<< (ostream& stream, const vector<pair<int, int>>& a) {
[20]     for (auto x : a) {
[21]         stream << x << " ";
[22]     }
[23]     return stream;
[24] }
[25]
[26] ostream& operator<< (ostream& stream, const pair<long long, long long>& a) {
[27]     stream << "{" << a.first << ", " << a.second << "}";
[28]     return stream;
[29] }
[30]
[31] ostream& operator<< (ostream& stream, const vector<long long>& a) {
[32]     for (auto x : a) {
[33]         stream << x << " ";
[34]     }
[35]     return stream;
[36] }
[37]
[38] ostream& operator<< (ostream& stream, const vector<pair<long long, long long>>& a) {
[39]     for (auto x : a) {
[40]         stream << x << " ";
[41]     }
[42]     return stream;
[43] }
[44]
[45]
[46]
[47]
[48]
[49]
[50]
[51]
[52]
[53]
[54] const int sz = 130;
[55] const int maxn = 50000;
[56]
[57] int main() {
[58]     vector<int> cnt_a(sz), cnt_b(sz);
[59]     string s, t;
[60]     cin >> s >> t;
[61]     if (t.size() == 0) {
[62]         cout << "";
[63]         return 0;
[64]     }
```



```

[65]     for (auto c : t) {
[66]         cnt_b[c]++;
[67]     }
[68]     int c = 0;
[69]     for (auto x : cnt_b) {
[70]         if (x) {
[71]             c++;
[72]         }
[73]     }
[74]     int n = (int) s.size();
[75]     int l = 0;
[76]     cnt_a[s[0]]++;
[77]     int cur = 0;
[78]     if (cnt_a[s[0]] == cnt_b[s[0]] && cnt_b[s[0]]) {
[79]         cur++;
[80]     }
[81]     if (cur == c) {
[82]         cout << s[0];
[83]         return 0;
[84]     }
[85]     pair<int, int> ans = {-1e8, 1e8};
[86]     for (int r = 1; r < n; r++) {
[87]         cnt_a[s[r]]++;
[88]         if (cnt_a[s[r]] == cnt_b[s[r]] && cnt_b[s[r]]) {
[89]             cur++;
[90]         }
[91]
[92]         while (cur == c && l <= r) {
[93]             // cout << l << ":" << r << " = " << cur << ", c = " << c << "\n";
[94]             // cout << "cnt_a = " << cnt_a << "\n";
[95]             if (cur == c) {
[96]                 if (ans.second - ans.first + 1 > r - l + 1) {
[97]                     ans = {l, r};
[98]                 }
[99]             }
[100]            if (cnt_a[s[l]] == cnt_b[s[l]] && cnt_b[s[l]]) {
[101]                cur--;
[102]            }
[103]            cnt_a[s[l]]--;
[104]            l++;
[105]        }
[106]    }
[107]    if (ans.first == -1e8 && ans.second == 1e8) {
[108]        cout << "";
[109]        return 0;
[110]    }
[111]    // cout << ans.first << ", " << ans.second << "\n";
[112]    for (int i = ans.first; i <= ans.second; i++) {
[113]        cout << s[i];
[114]    }
[115]
[116] }

```

Посылка по задаче 6

```
[1] #include <iostream>
[2] #include <vector>
[3] #include <algorithm>
[4] #include <map>
[5] #include <string>
[6] using namespace std;
[7] ostream& operator<< (ostream& stream, const pair<int, int>& a) {
[8]     stream << "{" << a.first << ", " << a.second << "}";
[9]     return stream;
[10] }
[11]
[12] ostream& operator<< (ostream& stream, const vector<int>& a) {
[13]     for (auto x : a) {
[14]         stream << x << " ";
[15]     }
[16]     return stream;
[17] }
[18]
[19] ostream& operator<< (ostream& stream, const vector<pair<int, int>>& a) {
[20]     for (auto x : a) {
[21]         stream << x << " ";
[22]     }
[23]     return stream;
[24] }
[25]
[26] ostream& operator<< (ostream& stream, const pair<long long, long long>& a) {
[27]     stream << "{" << a.first << ", " << a.second << "}";
[28]     return stream;
[29] }
[30]
[31] ostream& operator<< (ostream& stream, const vector<long long>& a) {
[32]     for (auto x : a) {
[33]         stream << x << " ";
[34]     }
[35]     return stream;
[36] }
[37]
[38] ostream& operator<< (ostream& stream, const vector<string>& a) {
[39]     for (auto x : a) {
[40]         stream << x << " ";
[41]     }
[42]     return stream;
[43] }
[44]
[45] ostream& operator<< (ostream& stream, const vector<pair<long long, long long>>& a) {
[46]     for (auto x : a) {
[47]         stream << x << " ";
[48]     }
[49]     return stream;
[50] }
[51]
[52] ostream& operator << (ostream& stream, const vector<bool>& a) {
[53]     for (auto to : a) {
[54]         cout << to;
[55]     }
[56]     return stream;
[57] }
[58]
[59] ostream& operator << (ostream& stream, const vector<vector<bool>>& a) {
[60]     for (auto to : a) {
[61]         cout << to << "\n";
[62]     }
[63]     return stream;
[64] }
[65]
[66]
[67]
[68]
[69]
[70]
[71] vector<string> parse(const string& a) {
[72]     string buf = "";
[73]     vector<string> res;
[74]     for (auto x : a) {
[75]         if (x == ';') {
```

```

[76]         res.push_back(buf);
[77]         buf = "";
[78]     } else {
[79]         buf += x;
[80]     }
[81] }
[82] res.push_back(buf);
[83] return res;
[84] }
[85]
[86] int main() {
[87]     string s;
[88]     map<string, vector<vector<bool>>> cnt;
[89]     map<string, int> len;
[90]     while (cin >> s) {
[91]         vector<string> res = parse(s);
[92]         vector<bool> cond;
[93]         len[res[0]] = max(len[res[0]], (int) res.size() - 1);
[94]         for (int i = 1; i < (int) res.size(); i++) {
[95]             cond.push_back(res[i] == "OK");
[96]         }
[97]         bool state = true;
[98]         for (auto x : cond) {
[99]             if (!x) {
[100]                 state = false;
[101]             }
[102]         }
[103]         if (!state) {
[104]             cnt[res[0]].push_back(cond);
[105]         }
[106]     }
[107] }
[108] for (auto& to : cnt) {
[109]     for (auto& w : to.second) {
[110]         // cout << w.size() << " " << len[to.first] << " " << to.first << "\n";
[111]         // cout << ((int) w.size() < len[to.first]) << "\n";
[112]         while ((int) w.size() < len[to.first]) {
[113]             w.push_back(false);
[114]         }
[115]     }
[116] }
[117]
[118] // for (auto to : cnt) {
[119] //     cout << to.first << ":\n" << to.second << "\n";
[120] // }
[121]
[122] map<string, int> clusters;
[123]
[124] for (auto to : cnt) {
[125]     bool S1 = false;
[126]     bool S2 = false;
[127]     int c = 0;
[128]     for (int j = 0; j < len[to.first]; j++) {
[129]         bool s1 = true;
[130]         bool s2 = true;
[131]
[132]         for (int i = 0; i < (int) to.second.size(); i++) {
[133]             if (to.second[i][j]) {
[134]                 s2 = false;
[135]             } else {
[136]                 s1 = false;
[137]             }
[138]         }
[139]         if (s1 || s2) {
[140]             S1 = S1 | s1;
[141]             S2 = S2 | s2;
[142]         } else {
[143]             c++;
[144]         }
[145]     }
[146]     clusters[to.first] = c + (int) S1 + (int) S2;
[147] }
[148] for (auto to : len) {
[149]     cout << to.second << " " << clusters[to.first] << "\n";
[150] }
[151] }

```