

Олимпиада «Ломоносов» по информатике  
2023-2024 учебный год. Заключительный тур  
Работа участника с id заявки 1261016, логином inf24f\_129

Сводный итог по всем задачам в проверяющей системе

Run ID	Time	User name	Problem	Language	Result	Tests	Score
8	0:09:08	inf24f_129	1	g++	OK	28	100
119	2:05:51	inf24f_129	2	g++	OK	28	100
68	1:14:13	inf24f_129	3	g++	Partial solution	11	32
24	0:27:59	inf24f_129	5	g++	OK	22	100
332 технических балла							
66 итоговых баллов							

## Посылка по задаче 1

```
[1] #include <bits/stdc++.h>
[2] using ll = long long;
[3] using namespace std;
[4]
[5] int main() {
[6]     vector<ll> a;
[7]     a.push_back(0);
[8]     a.push_back(0);
[9]     a.push_back(1);
[10]    ll len = 3;
[11]    ll maxx = (1 << 24);
[12]    while (a[len - 1] < maxx) {
[13]        //cout << len << " " << a[len - 1] << " " << maxx << endl;
[14]        a.push_back(a[len - 1] + a[len - 2] + a[len - 3]);
[15]        len += 1;
[16]    }
[17]    //cout << "sz " << a.size();
[18]    ll n;
[19]    cin >> n;
[20]    ll ans = 0;
[21]    for (int i = 0; i < n; i++) {
[22]        ll t;
[23]        cin >> t;
[24]        ll cnt = 0;
[25]        for (int j = a.size() - 1; j > 1; j--) {
[26]            if (t >= a[j]) {
[27]                cnt += 1;
[28]                t -= a[j];
[29]            }
[30]        }
[31]        //cout << cnt << endl;
[32]        ans += cnt % 2;
[33]    }
[34]    cout << ans << endl;
[35] }
```

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## Посылка по задаче 2

```
[1] #include <bits/stdc++.h>
[2] using ll = long long;
[3] using namespace std;
[4] vector<vector<ll>> gr;
[5] vector<char> color;
[6] map<char, vector<ll>> cnt;
[7]
[8] bool c(pair<vector<ll>, char> l, pair<vector<ll>, char> r) {
[9]     if (l.first == r.first) {
[10]         return l.second > r.second;
[11]     }
[12]     bool ans = l.first.size() >= r.first.size();
[13]     for (int i = 0; i < min(l.first.size(), r.first.size()); i++) {
[14]         if (l.first[i] > r.first[i]) {
[15]             ans = true;
[16]             break;
[17]         } else if (l.first[i] < r.first[i]) {
[18]             ans = false;
[19]             break;
[20]         }
[21]     }
[22]     return ans;
[23] }
[24]
[25] ll create(string s, ll ind) {
[26]     //cout << s << " " << ind << endl;
[27]     if (s[0] != 'Q') {
[28]         return 1;
[29]     }
[30]     ll i = 1;
[31]     for (int _ = 0; _ < 4; _++) {
[32]         gr[ind].push_back(ind + i);
[33]         if (s[i] == 'Q') {
[34]             i += create(s.substr(i, s.size() - i), ind + i);
[35]         }
[36]         i += 1;
[37]     }
[38]     return i - 1;
[39] }
[40]
[41] void dfs(ll v, ll x) {
[42]     //cout << v << " " << x << endl;
[43]     cnt[color[v]][x * 2] += 1;
[44]     for (auto e : gr[v]) {
[45]         dfs(e, x + 1);
[46]     }
[47] }
[48]
[49] vector<ll> norm(vector<ll> lst) {
[50]     for(int i = 1364; i > 0; i--) {
[51]         lst[i - 1] += lst[i] / 2;
[52]         lst[i] %= 2;
[53]     }
[54]     return lst;
[55] }
[56]
[57] int main() {
[58]     string s;
[59]     cin >> s;
[60]     ll n = s.size();
[61]     gr.resize(n);
[62]     color.resize(n);
[63]     for (int i = 0; i < n; i++) {
[64]         color[i] = s[i];
[65]     }
[66]     create(s, 0);
[67]     for (auto e : "QWROYGCBVD") {
[68]         cnt[e] = vector<ll>(1365, 0);
[69]     }
[70]     dfs(0, 0);
[71]     vector<pair<vector<ll>, char>> ans;
[72]     for (auto e : cnt) {
[73]         if (e.first != 'Q') ans.push_back({norm(e.second), e.first});
[74]         //cout << e.first << " ";
[75]         //for (auto e : norm(e.second)) {
[76]             // cout << e << " ";
[77]         //}
[78]         //cout << endl;
[79]     }
[80]     sort(ans.begin(), ans.end(), c);
[81]     cout << ans[0].second << endl;
[82]     cout << ans[0].first[0] << "." << ans[0].first[1];
[83]     ll maxx = 2;
[84]     for (int i = 2; i < ans[0].first.size(); i++) {
[85]         if (ans[0].first[i] == 1) {
[86]             maxx = i + 1;
[87]         }
[88]     }
[89]     for (int i = 2; i < maxx; i++) {
[90]         cout << ans[0].first[i];
[91]     }
[92]     cout << endl;
[93] }
```

### Посылка по задаче 3

```
[1] #include <bits/stdc++.h>
[2] using ll = long long;
[3] using namespace std;
[4]
[5] vector<string> x = {"()", ">", ">!", ">!!", ">!!!", ">?", "<", "<!", "<!!", "<!!!", "<?"};
[6]
[7] ll ind(vector<string> x, string y) {
[8]     ll ans = -1;
[9]     for (int i = 0; i <= 10; i++) {
[10]         if (y == x[i]) {
[11]             ans = i;
[12]         }
[13]     }
[14]     return ans;
[15] }
[16]
[17] ll from(string s) {
[18]     ll n = s.size();
[19]     string now;
[20]     ll i = 0;
[21]     vector<ll> ans;
[22]     ll delt = 1;
[23]     if ((s[n - 1] == '>') || (s[n - 1] == '<')) delt = 0;
[24]     while (i < (n - delt)) {
[25]         now = now + s[i];
[26]         while (i < (n - 1) && (ind(x, now) != -1 || now == "(")) {
[27]             i += 1;
[28]             now = now + s[i];
[29]         }
[30]         if (ind(x, now) == -1) {
[31]             i -= 1;
[32]             now = now.substr(0, now.size() - 1);
[33]         }
[34]         //cout << now << " " << ind(x, now) << " " << s << " " << i << endl;
[35]         ans.push_back(ind(x, now));
[36]         now = "";
[37]         i += 1;
[38]     }
[39]     //reverse(ans.begin(), ans.end());
[40]     ll ten = 1;
[41]     ll res = 0;
[42]     for (int j = 0; j < ans.size(); j++) {
[43]         res += ten * ans[j];
[44]         ten = ten * 10;
[45]     }
[46]     return res;
[47] }
[48]
[49] string to(ll n) {
[50]     string ans = "";
[51]     vector<ll> nums;
[52]     while (n != 0 || nums.size() == 0) {
[53]         nums.push_back(n % 10);
[54]         n = n / 10;
[55]     }
```

```

[56]     for (int i = 0; i < nums.size() - 1; i++) {
[57]         if (nums[i] == 0) {
[58]             nums[i] = 10;
[59]             nums[i + 1] -= 1;
[60]         }
[61]         ans = ans + x[nums[i]];
[62]     }
[63]     if (nums[nums.size() - 1] != 0 || nums.size() == 1) {
[64]         ans = ans + x[nums[nums.size() - 1]];
[65]     }
[66]     //reverse(nums.begin(), nums.end());
[67]     return ans;
[68] }
[69]
[70] int main() {
[71]     /*
[72]     cout << from("(") << " " << to(0) << endl;
[73]     cout << from("<?") << " " << to(10) << endl;
[74]     cout << from(">!!!<?>") << " " << to(2024) << endl;
[75]     */
[76]     ll n;
[77]     cin >> n;
[78]     ll ansi = 0, ansj = 1;
[79]     ll minn = 0, maxx = 0;
[80]     vector<ll> lst;
[81]     for (int i = 0; i < n; i++) {
[82]         string s;
[83]         cin >> s;
[84]         ll n = from(s);
[85]         //cout << s << " " << n << endl;
[86]         lst.push_back(n);
[87]         if (i != 0) {
[88]             if ((abs(lst[ansi] - lst[ansj]) < abs(lst[minn] - lst[i])) || (abs(lst[ansi] - lst[ansj]) == abs(lst[minn] - lst[i]) && ((ansi + ansj)
[89]                 ansi = minn;
[90]                 ansj = i;
[91]             }
[92]             if ((abs(lst[ansi] - lst[ansj]) < abs(lst[maxx] - lst[i])) || (abs(lst[ansi] - lst[ansj]) == abs(lst[maxx] - lst[i]) && ((ansi + ansj)
[93]                 ansi = maxx;
[94]                 ansj = i;
[95]             }
[96]         }
[97]         if (lst[minn] > lst[i]) {
[98]             minn = i;
[99]         }
[100]         if (lst[maxx] < lst[i]) {
[101]             maxx = i;
[102]         }
[103]     }
[104]     //cout << ansi << " " << ansj << endl;
[105]     cout << to(ansi + 1) << endl << to(ansj + 1) << endl;
[106] }

```

Посылок по задаче 4 не было

## Посылка по задаче 5

```
[1] #include <bits/stdc++.h>
[2] using ll = long long;
[3] using namespace std;
[4]
[5] int main() {
[6]     string s, x;
[7]     cin >> s >> x;
[8]     ll n = s.size();
[9]     vector<ll> cnt(126, 0), now(126, 0);
[10]    for (auto e : x) {
[11]        cnt[e - '!'] += 1;
[12]    }
[13]    ll ansi = 0, ansj = 0;
[14]    ll i = 0, j = 0;
[15]    set<char> must;
[16]    for (auto e : x) {
[17]        must.insert(e);
[18]    }
[19]    while (j < n) {
[20]        while (j < n && must.size() > 0) {
[21]            now[s[j] - '!'] += 1;
[22]            if (now[s[j] - '!'] >= cnt[s[j] - '!']) {
[23]                must.erase(s[j]);
[24]            }
[25]            j += 1;
[26]        }
[27]        //cout << ansi << " " << ansj << " " << i << " " << j << " " << must.size() << endl;
[28]        if (must.size() == 0 && (ansj == 0 || (ansj - ansi) > (j - i))) {
[29]            ansi = i;
[30]            ansj = j;
[31]        }
[32]        now[s[i] - '!'] -= 1;
[33]        if (now[s[i] - '!'] < cnt[s[i] - '!']) {
[34]            must.insert(s[i]);
[35]        }
[36]        i += 1;
[37]    }
[38]    for (int i = ansi; i < ansj; i++) {
[39]        cout << s[i];
[40]    }
[41]    cout << endl;
[42] }
```

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