

Олимпиада «Ломоносов» по информатике
2023-2024 учебный год. Заключительный тур
Работа участника с id заявки 1245148, логином inf24f_259

Сводный итог по всем задачам в проверяющей системе

Run ID	Time	User name	Problem	Language	Result	Tests	Score
251	1:39:05	inf24f_259	1	g++	OK	28	100
463	3:08:04	inf24f_259	2	g++	Partial solution	20	68
693	3:59:31	inf24f_259	3	g++	Partial solution	5	8
183	1:10:47	inf24f_259	4	g++	OK	21	100
186	1:11:14	inf24f_259	5	g++	OK	22	100
376 технических баллов							
62 итоговых балла							

Посылка по задаче 1

```
[1] #include <bits/stdc++.h>
[2] using namespace std;
[3]
[4] typedef long long ll;
[5] typedef long double ld;
[6]
[7] vector<ll> T;
[8]
[9] bool conv(ll x) {
[10]     int cnt1 = 0;
[11]     for (int i = (int)T.size() - 1; i >= 4; i --) {
[12]         if (x >= T[i]) {
[13]             x -= T[i];
[14]             cnt1 += 1;
[15]         }
[16]     }
[17]     return (cnt1 % 2 == 0);
[18] }
[19]
[20] int main() {
[21]     ios::sync_with_stdio(false);
[22]     cin.tie(nullptr);
[23]     int N = 60;
[24]     T.resize(N);
[25]     T[0] = 0;
[26]     T[1] = 0;
[27]     T[2] = 0;
[28]     T[3] = 1;
[29]     for (int i = 4; i < N; i++) {
[30]         T[i] = T[i - 1] + T[i - 2] + T[i - 3] + T[i - 4];
[31]     }
[32]     int n;
[33]     cin >> n;
[34]     int ans = 0;
[35]     while(n --) {
[36]         int x;
[37]         cin >> x;
[38]         ans += conv(x);
[39]     }
[40]     cout << ans;
[41]     return 0;
[42] }
```

Посылка по задаче 2

```
[1] #include <bits/stdc++.h>
[2] using namespace std;
[3]
[4] typedef long long ll;
[5] typedef long double ld;
[6]
[7] vector<vector<ll>> cnt(9, vector<ll> (1000000));
[8]
[9] string s;
[10] int d = -1;
[11]
[12] int get_deep(int pos, int deep) {
[13]     if (s[pos] == 'Q') {
[14]         int tec = pos + 1;
[15]         for (int i = 0; i < 8; i++) {
[16]             tec = get_deep(tec, deep + 1);
[17]         }
[18]         return tec;
[19]     } else {
[20]         d = max(d, deep);
[21]         return pos + 1;
[22]     }
[23] }
[24] string alph = "WROYGCBVD";
[25] map<char, int> m;
[26] int dfs(int pos, int deep) {
[27]     if (s[pos] == 'Q') {
[28]         int tec = pos + 1;
[29]         for (int i = 0; i < 8; i++) {
[30]             tec = dfs(tec, deep - 1);
[31]         }
[32]         return tec;
[33]     } else {
[34]         cnt[m[s[pos]]][deep]++;
[35]         return pos + 1;
[36]     }
[37] }
[38]
[39] string conv(ll x) {
[40]     if (x == 0) return "000";
[41]     if (x == 1) return "001";
[42]     if (x == 2) return "010";
[43]     if (x == 3) return "011";
[44]     if (x == 4) return "100";
[45]     if (x == 5) return "101";
[46]     if (x == 6) return "110";
[47]     if (x == 7) return "111";
[48] }
[49]
```

```

[50] void print(string & tec, int d) {
[51] /*     reverse(tec.begin(), tec.end());
[52]     while(tec.back() == '0') tec.pop_back();
[53]     reverse(tec.begin(), tec.end());*/
[54]     string prev;
[55]     for (int i = 0; i < 3 * d; i++) {
[56]         prev += tec[tec.size() - 1 - i];
[57]     }
[58]     reverse(prev.begin(), prev.end());
[59]     tec = "0." + prev;
[60]     while(tec.back() == '0') tec.pop_back();
[61]     if (tec == "0.") {
[62]         cout << "1.0";
[63]     }else {
[64]         cout << tec;
[65]     }
[66] }
[67]
[68] int main() {
[69]     ios::sync_with_stdio(false);
[70]     cin.tie(nullptr);
[71]     for (int i = 0; i < 9; i++) {
[72]         m[alph[i]] = i;
[73]     }
[74]     cin >> s;
[75]     get_deep(0, 0);
[76]     dfs(0, d);
[77]     vector<string> ans(9);
[78]     for (int j = 0; j < 9; j++) {
[79]         int last = 0;
[80]         for (int i = 0; i < 1000000 - 1; i++) {
[81]             cnt[j][i + 1] += cnt[j][i] / 8;
[82]             cnt[j][i] = cnt[j][i] % 8;
[83]             if (cnt[j][i] != 0) last = i;
[84]         }
[85]         for (int i = last; i >= 0; i--) ans[j] += conv(cnt[j][i]);
[86]         if (ans[j].empty()) ans[j] = '0';
[87]     }
[88]     int ind = 0;
[89]     for (int i = 1; i < 9; i++) {
[90]         if (ans[i] > ans[ind] || (ans[i] == ans[ind] && alph[i] < alph[ind])) ind = i;
[91]     }
[92]     cout << alph[ind] << '\n';
[93]     print(ans[ind], d);
[94]     return 0;
[95] }

```

Посылка по задаче 3

```
[1] #include <bits/stdc++.h>
[2] using namespace std;
[3]
[4] typedef long long ll;
[5] typedef long double ld;
[6]
[7]
[8]
[9] vector<int> To(string s) {
[10]     int n = (int)s.size();
[11]     vector<int> a;
[12]     int i = 0;
[13]     while(i < n) {
[14]         if (s[i] == '[') {
[15]             a.push_back(0);
[16]             i += 2;
[17]         }
[18]         if (s[i] == 'i') {
[19]             if (i + 1 < s.size() && s[i + 1] == '(') {
[20]                 if (i + 2 < s.size() && s[i + 2] == '(') {
[21]                     a.push_back(3);
[22]                     i += 3;
[23]                 } else {
[24]                     a.push_back(2);
[25]                     i += 2;
[26]                 }
[27]             } else {
[28]                 a.push_back(1);
[29]                 i += 1;
[30]             }
[31]         }
[32]         if (s[i] == 'I') {
[33]             if (i + 1 < s.size() && s[i + 1] == '(') {
[34]                 if (i + 2 < s.size() && s[i + 2] == '(') {
[35]                     a.push_back(6);
[36]                     i += 3;
[37]                 } else {
[38]                     a.push_back(5);
[39]                     i += 2;
[40]                 }
[41]             } else {
[42]                 a.push_back(4);
[43]                 i += 1;
[44]             }
[45]         }
[46]         if (s[i] == 'J') {
[47]             if (i + 1 < s.size() && s[i + 1] == ')') {
[48]                 if (i + 2 < s.size() && s[i + 2] == ')') {
[49]                     a.push_back(9);
[50]                     i += 3;
[51]                 } else {
[52]                     a.push_back(8);
[53]                     i += 2;
[54]                 }
[55]             } else {
[56]                 a.push_back(7);
[57]                 i += 1;
[58]             }
[59]         }
[60]         if (s[i] == 'j') {
[61]             if (i + 1 < s.size() && s[i + 1] == ')') {
[62]                 if (i + 2 < s.size() && s[i + 2] == ')') {
[63]                     a.push_back(3);
[64]                     i += 12;
[65]                 } else {
[66]                     a.push_back(2);
[67]                     i += 11;
[68]                 }
[69]             } else {
[70]                 a.push_back(1);
[71]                 i += 10;
[72]             }
[73]         }
[74]     }
[75]     reverse(a.begin(), a.end());
[76]
[77]     for (i = a.size() - 1; i > 0; i --) {
[78]         if (a[i] == 12) {
[79]             a[i - 1] += 1;
[80]             a[i] = 0;
[81]         }
[82]     }
[83]     if (a[0] == 12) {
[84]         a[0] = 0;

```

```

[85]     a.insert(a.begin(), 1);
[86] }
[87] return a;
[88] }
[89]
[90]
[91] bool menea(vector<int>& a, vector<int>& b) {
[92]     if (a.size() < b.size()) return true;
[93]     return a < b;
[94] }
[95]
[96] bool bolee(vector<int>& a, vector<int>& b) {
[97]     if (a.size() > b.size()) return true;
[98]     return a > b;
[99] }
[100]
[101]
[102] map<vector<int>, string> m;
[103]
[104] vector<string> alph = {
[105]     "[", "i", "i(", "i(((", "I", "I(", "I(((", "J", "J)", "J))", "j", "j)", "j))"
[106] };
[107]
[108] vector<int> help(int x) {
[109]     vector<int> ans;
[110]     while(x != 0) {
[111]         ans.push_back(x % 10);
[112]         x /= 10;
[113]     }
[114]     reverse(ans.begin(), ans.end());
[115]     return ans;
[116] }
[117]
[118]
[119] int main() {
[120]     ios::sync_with_stdio(false);
[121]     cin.tie(nullptr);
[122]     int n;
[123]     cin >> n;
[124]     for (int i = 1; i <= n; i++) {
[125]         string tec;
[126]         for (auto x : help(i)) tec += alph[x];
[127]         m[To(tec)] = tec;
[128]     }
[129]     int k = -1;
[130]     int l = -1;
[131]     vector<int> mini;
[132]     vector<int> maxi;
[133]     for (int i = 0; i < n; i++) {
[134]         string s;
[135]         cin >> s;
[136]         vector<int> tec = To(s);
[137]         if (mini.empty()) {
[138]             mini = tec;
[139]             k = i;
[140]         }
[141]         if (maxi.empty()) {
[142]             maxi = tec;
[143]             l = i;
[144]         }
[145]         if (tec == mini) {
[146]             k = i;
[147]         }else if (menea(tec, mini)) {
[148]             mini = tec;
[149]             k = i;
[150]         }
[151]         if (tec == maxi) {
[152]             l = i;
[153]         }else if (bolee(tec, maxi)) {
[154]             maxi = tec;
[155]             l = i;
[156]         }
[157]     }
[158]     if (mini == maxi) {
[159]         k = n - 2;
[160]         l = n - 1;
[161]     }
[162]     k++;
[163]     l++;
[164]     if (k > l) swap(k, l);
[165]     cout << m[help(k)] << endl << m[help(l)];
[166]     return 0;
[167] }

```

Посылка по задаче 4

```
[1] #include <bits/stdc++.h>
[2] using namespace std;
[3]
[4] typedef long long ll;
[5] typedef long double ld;
[6]
[7] int main() {
[8]     ios::sync_with_stdio(false);
[9]     cin.tie(nullptr);
[10]     int n, m;
[11]     cin >> n >> m;
[12]     ll dp[m + 1][n][n];
[13]     ll cost[n][m];
[14]     int st1, st2, st3;
[15]     cin >> st1 >> st2 >> st3;
[16]
[17]     for (int i = 0; i < n; i++) {
[18]         for (int j = 0; j < m; j++) {
[19]             cin >> cost[i][j];
[20]         }
[21]     }
[22]     for (int x = 0; x < n; x++) {
[23]         for (int y = 0; y < n; y++) {
[24]             for (int z = 0; z < n; z++) {
[25]                 dp[0][x][y][z] = -1;
[26]             }
[27]         }
[28]     }
[29]     dp[0][st1][st2][st3] = 0;
[30]     set<int> dop = {st1, st2, st3};
[31]     for (auto ind : dop) dp[0][st1][st2][st3] += cost[ind][0];
[32]     for (int i = 1; i < m; i++) {
[33]         for (int x = 0; x < n; x++) {
[34]             for (int y = 0; y < n; y++) {
[35]                 for (int z = 0; z < n; z++) {
[36]                     ll tec = 0;
[37]                     dop = {x, y, z};
[38]                     for (auto ind : dop) tec += cost[ind][i];
[39]                     dp[i][x][y][z] = -1;
[40]                     for (int a = max(0, x-1); a < min(n, x + 2); a++) {
[41]                         for (int b = max(0, y-1); b < min(n, y + 2); b++) {
[42]                             for (int c = max(0, z-1); c < min(n, z + 2); c++) {
[43]                                 if (dp[i - 1][a][b][c] == -1) continue;
[44]                                 dp[i][x][y][z] = max(dp[i][x][y][z], dp[i - 1][a][b][c] + tec);
[45]                             }
[46]                         }
[47]                     }
[48]                 }
[49]             }
[50]         }
[51]     }
[52]     ll ans = -1;
[53]     for (int x = 0; x < n; x++) {
[54]         for (int y = 0; y < n; y++) {
[55]             for (int z = 0; z < n; z++) {
[56]                 ans = max(ans, dp[m - 1][x][y][z]);
[57]             }
[58]         }
[59]     }
[60]     cout << ans;
[61]     return 0;
[62] }
```

Посылка по задаче 5

```
[1] #include <bits/stdc++.h>
[2] using namespace std;
[3]
[4] typedef long long ll;
[5] typedef long double ld;
[6]
[7] int conv(char x) {
[8]     return (int)x - 33;
[9] }
[10]
[11] bool chk(vector<int> & need, vector<int> & tec) {
[12]     for (int i = 0; i < 100; i++) {
[13]         if (tec[i] < need[i]) return false;
[14]     }
[15]     return true;
[16] }
[17]
[18] int main() {
[19]     ios::sync_with_stdio(false);
[20]     cin.tie(nullptr);
[21]     string s;
[22]     cin >> s;
[23]     int n = (int)s.size();
[24]     /* vector<vector<int>> a(n + 1, vector<int> (100));
[25]     for (int i = 1; i < n; i++) {
[26]         a[i][conv(s[i - 1])]++;
[27]         for (int j = 0; j < 100; j++) {
[28]             a[i][j] += a[i - 1][j];
[29]         }
[30]     */
[31]     vector<int> tec(100);
[32]     vector<int> need(100);
[33]     string b;
[34]     cin >> b;
[35]     for (int i = 0; i < b.size(); i++) {
[36]         need[conv(b[i])]++;
[37]     }
[38]     int r = 1;
[39]     tec[conv(s[0])]++;
[40]     int left = -1, right = -1;
[41]     for (int i = 0; i < n; i++) {
[42]         while(r < n && !chk(need, tec)) {
[43]             tec[conv(s[r])]++;
[44]             r++;
[45]         }
[46]         if (r <= n && chk(need, tec)) {
[47]             if (left == -1 || r - i < right - left) {
[48]                 right = r;
[49]                 left = i;
[50]             }
[51]         }
[52]         tec[conv(s[i])]--;
[53]     }
[54]     if (left == -1) return 0;
[55]     for (int i = left; i < right; i++) {
[56]         cout << s[i];
[57]     }
[58]     return 0;
[59] }
```


Посылоч по задаче 6 не было