

Олимпиада «Ломоносов» по информатике  
2023-2024 учебный год. Заключительный тур  
Работа участника с id заявки 1260015, логином inf24f\_202

Сводный итог по всем задачам в проверяющей системе

Run ID	Time	User name	Problem	Language	Result	Tests	Score
7	0:08:14	inf24f_202	1	python3	OK	28	100
142	1:00:29	inf24f_202	2	python3	OK	28	100
216	1:24:34	inf24f_202	3	python3	Partial solution	12	36
261	1:46:54	inf24f_202	4	g++	OK	21	100
321	2:07:18	inf24f_202	5	g++	OK	22	100
393	2:36:03	inf24f_202	6	g++	Partial solution	6	50
486 технических баллов							
81 итоговый балл							

## Посылка по задаче 1

```
[1] T = [0, 0, 0, 1]
[2] for i in range(1000):
[3]     T.append(T[-1] + T[-2] + T[-3] + T[-4])
[4] n = int(input())
[5] a = [int(input()) for i in range(n)]
[6] k = 0
[7] for i in range(n):
[8]     cnt = 0
[9]     for j in range(100, 2, -1):
[10]         if a[i] >= T[j]:
[11]             cnt += 1
[12]             a[i] -= T[j]
[13]     if cnt % 2 == 0:
[14]         k += 1
[15] print(k)
```

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## Посылка по задаче 2

```
[1] s = input()
[2] mp = {}
[3] n = len(s)
[4] stack = [0]
[5] for i in range(n):
[6]     if s[i] == 'Q':
[7]         stack.append(0)
[8]         continue
[9]     mp[s[i]] = mp.get(s[i], [0] * 12001)
[10]    mp[s[i]][3 * (len(stack) - 1)] += 1
[11]    stack[-1] += 1
[12]    #print(i, len(stack) - 1, stack[-1])
[13]    while len(stack) and stack[-1] == 8:
[14]        if len(stack) >= 2:
[15]            stack[-2] += 1
[16]            stack.pop(-1)
[17] c = 'Z'
[18] a = [0] * 12000
[19] maxcnt = 0
[20] for p in sorted("WROYGCBVD"):
[21]     mp[p] = mp.get(p, [0] * 12001)
[22]     #print(p, mp[p][:15])
[23]     cnt = 0
[24]     for i in range(12000, 0, -1):
[25]         mp[p][i-1] += mp[p][i] // 2
[26]         mp[p][i] %= 2
[27]         if mp[p][i] == 1:
[28]             cnt += 1
[29]
[30]     if mp[p] > a or (mp[p] == a and p <= c):
[31]         a = mp[p]
[32]         c = p
[33]         maxcnt = cnt
[34] print(c)
[35] res = a
[36] if res.count(1) == 0:
[37]     print(0.0)
[38] elif res.count(1) == 1 and res[0] == 1:
[39]     print(1.0)
[40] else:
[41]     print("0.", end="")
[42]     for i in range(1, len(res)):
[43]         print(res[i], end='')
[44]         maxcnt -= res[i]
[45]         if maxcnt == 0:
[46]             break
[47]
[48]
```

### Посылка по задаче 3

```
[1]
[2] def to(n):
[3]     a = []
[4]     mp = ['[', 'i', 'i(', 'i(((', 'I', 'I)', 'I)'), 'J', 'J)', 'J)'), 'j', 'j(', 'j(((']
[5]     while n:
[6]         if n % 12 == 0:
[7]             a.append(mp[-1])
[8]         else:
[9]             a.append(mp[n % 12])
[10]            n //=12
[11]    if len(a) == 0:
[12]        a.append(mp[0])
[13]    return a
[14]
[15]
[16] n = int(input())
[17] s = [input() for i in range(n)]
[18] a = [0] * n
[19] for i in range(n):
[20]     if s[i] == "[]":
[21]         continue
[22]     now = 0
[23]     for j in range(len(s[i])):
[24]         if s[i][j] == 'i':
[25]             now = max(now + 1, now * 12)
[26]             a[i] += 1 * now
[27]         elif s[i][j] == 'I':
[28]             now = max(now + 1, now * 12)
[29]             a[i] += 4 * now
[30]         elif s[i][j] == 'J':
[31]             now = max(now + 1, now * 12)
[32]             a[i] += 7 * now
[33]         elif s[i][j] == 'j':
[34]             now = max(now + 1, now * 12)
[35]             a[i] += 10 * now
[36]         else:
[37]             a[i] += now
[38] k = 0
[39] l = 1
[40] for i in range(n):
[41]     for j in range(i + 1, n):
[42]         if abs(a[i] - a[j]) > abs(a[k] - a[l]):
[43]             k = i
[44]             l = j
[45]         elif abs(a[i] - a[j]) == abs(a[k] - a[l]) and i + j > k + l:
[46]             k = i
[47]             l = j
[48]
[49] print(*to(k + 1), sep='')
[50] print(*to(l + 1), sep='')
```

## Посылка по задаче 4

```
[1] #include <iostream>
[2] #include<string>
[3] #include<vector>
[4] #include<map>
[5] #include<set>
[6] #include<iomanip>
[7] #include<sstream>
[8] #include<queue>
[9] #include<algorithm>
[10] #include<deque>
[11] #include<bitset>
[12]
[13] using namespace std;
[14]
[15] #define endl "\n"
[16]
[17] using ll = long long;
[18] using db = double;
[19] using vi = vector<int>;
[20] using vl = vector<ll>;
[21] using pii = pair<int, int>;
[22] using pll = pair<ll, ll>;
[23]
[24] #define all(x) x.begin(), x.end()
[25] #define cinv(x) for(auto &el: x) cin >> el;
[26] int main() {
[27]     //
[28]     freopen("input.txt", "r", stdin); freopen("output.txt", "w", stdout);
[29]     //
[30]     ios_base::sync_with_stdio(0); cin.tie(0);
[31]     int R, C;
[32]     cin >> R >> C;
[33]     int r1, r2, r3;
[34]
[35]     cin >> r1 >> r2 >> r3;
[36]     vector<vl> t(R, vl(C));
[37]     for (int i = 0; i < R; i++){
[38]         cinv(t[i]);
[39]     }
[40]     if (r3 <= r1){
[41]         swap(r3, r1);
[42]     }
[43]     if (r2 <= r1){
[44]         swap(r2, r1);
[45]     }
[46]     if (r3 <= r2){
[47]         swap(r3, r2);
[48]     }
[49]     vector<vector<vector<vl>>> dp(C, vector<vector<vl>> (20, vector<vl> (20, vl(20, -1))));
[50]     if (r1 == r2 && r2 == r3){
[51]         dp[0][r1][r2][r3] = t[r1][0];
[52]     }else if (r1 == r2){
[53]         dp[0][r1][r2][r3] = t[r1][0] + t[r3][0];
[54]     }else if (r1 == r3){
[55]         dp[0][r1][r2][r3] = t[r1][0] + t[r2][0];
[56]     }else if (r2 == r3){
[57]         dp[0][r1][r2][r3] = t[r1][0] + t[r2][0];
[58]     }else{
[59]         dp[0][r1][r2][r3] = t[r1][0] + t[r2][0] + t[r3][0];
[60]     }
```

```

[61]
[62]     for (int i = 0; i < C - 1; ++i) {
[63]         for (int p1 = 0; p1 < R; p1++){
[64]             for (int p2 = 0; p2 < R; p2++){
[65]                 for (int p3 = 0; p3 < R; p3++){
[66]                     if (dp[i][p1][p2][p3] != -1){
[67]                         for (int m1 = -1; m1 <= 1; ++m1) {
[68]                             if (p1 + m1 < 0 || p1 + m1 >= R){
[69]                                 continue;
[70]                             }
[71]                             for (int m2 = -1; m2 <= 1; ++m2) {
[72]                                 if (p2 + m2 < 0 || p2 + m2 >= R){
[73]                                     continue;
[74]                                 }
[75]                                 for (int m3 = -1; m3 <= 1; ++m3) {
[76]                                     if (p3 + m3 < 0 || p3 + m3 >= R){
[77]                                         continue;
[78]                                     }
[79]                                     int a = p1 + m1, b = p2 + m2, c = p3 + m3;
[80]                                     if (a == b && b == c){
[81]                                         dp[i + 1][a][b][c] = max(dp[i][p1][p2][p3] + t[a]
[82] [i + 1], dp[i + 1][a][b][c]);
[83]                                         }else if (a == b){
[84]                                             dp[i + 1][a][b][c] = max(dp[i][p1][p2][p3] + t[a]
[85] [i + 1] + t[c][i + 1], dp[i + 1][a][b][c]);
[86]                                             }else if(b == c || a == c){
[87]                                                 dp[i + 1][a][b][c] = max(dp[i][p1][p2][p3] + t[a]
[88] [i + 1] + t[b][i + 1], dp[i + 1][a][b][c]);
[89]                                                 }else{
[90]                                                     dp[i + 1][a][b][c] = max(dp[i][p1][p2][p3] + t[a]
[91] [i + 1] + t[b][i + 1] + t[c][i + 1], dp[i + 1][a][b][c]);
[92]                                                 }
[93]                                             }
[94]                                         }
[95]                                     }
[96]                                 }
[97]                             }
[98]                         }
[99]                     }
[100]                 }
[101]             }
[102]         }
[102]         ll res = 0;
[103]         for (int p1 = 0; p1 < R; p1++){
[104]             for (int p2 = 0; p2 < R; p2++){
[105]                 for (int p3 = 0; p3 < R; p3++){
[106]                     res = max(res, dp[C - 1][p1][p2][p3]);
[107]                 }
[108]             }
[109]         }
[109]         cout << res;

        return 0;
    }
}

```

## Посылка по задаче 5

```
[1] #include <iostream>
[2] #include<string>
[3] #include<vector>
[4] #include<map>
[5] #include<set>
[6] #include<iomanip>
[7] #include<sstream>
[8] #include<queue>
[9] #include<algorithm>
[10] #include<deque>
[11] #include<bitset>
[12]
[13] using namespace std;
[14]
[15] #define endl "\n"
[16]
[17] using ll = long long;
[18] using db = double;
[19] using vi = vector<int>;
[20] using vl = vector<ll>;
[21] using pii = pair<int, int>;
[22] using pll = pair<ll, ll>;
[23]
[24] #define all(x) x.begin(), x.end()
[25] #define cinv(x) for(auto &el: x) cin >> el;
[26] int main() {
[27]     //
[28]     freopen("input.txt", "r", stdin); freopen("output.txt", "w", stdout);
[29]     //
[30]     ios_base::sync_with_stdio(0); cin.tie(0);
[31]     string s;
[32]     cin >> s;
[33]     string t;
[34]     cin >> t;
[35]     int n = s.size();
[36]     vector<vi> pref(n + 1, vi(200));
[37]     for (int i = 0; i < n; ++i) {
[38]         for (int j = 20; j < 150; ++j) {
[39]             pref[i + 1][j] = pref[i][j] + bool(s[i] == j);
[40]         }
[41]     }
[42]     map<int, int> cnt;
[43]     for (int i = 0; i < t.size(); ++i) {
[44]         cnt[t[i]]++;
[45]     }
[46]     pii res = {-1, n + 500};
[47]     for (int i = 0; i < n; ++i) {
[48]         int left = i, right = n;
[49]         while(right - left > 1){
[50]             int mid = (left + right) / 2;
[51]             bool flag = true;
[52]             for (auto el: cnt) {
[53]                 int j = el.first;
[54]                 if (pref[mid][j] - pref[i][j] < cnt[j]){
[55]                     flag = false;
[56]                     break;
[57]                 }
[58]             }
[59]             if (flag){
[60]                 right = mid;
[61]             }else{
[62]                 left = mid;
[63]             }
[64]         }
[65]         bool flag = true;
[66]         for (auto el: cnt) {
[67]             int j = el.first;
[68]             if (pref[right][j] - pref[i][j] < cnt[j]){
[69]                 flag = false;
[70]                 break;
[71]             }
[72]         }
[73]         if (flag && right - i < res.second - res.first){
[74]             res.second = right;
[75]             res.first = i;
[76]         }
[77]     }
[78]     if (res.first != -1){
[79]         for (int i = res.first; i < res.second; i++){
[80]             cout << s[i];
[81]         }
[82]     }else{
[83]         cout << "";
[84]     }
[85]     return 0;
[86] }
[87] }
```

## Посылка по задаче 6

```
[1] #include <iostream>
[2] #include<string>
[3] #include<vector>
[4] #include<map>
[5] #include<set>
[6] #include<iomanip>
[7] #include<sstream>
[8] #include<queue>
[9] #include<algorithm>
[10] #include<deque>
[11] #include<bitset>
[12]
[13] using namespace std;
[14]
[15] #define endl "\n"
[16]
[17] using ll = long long;
[18] using db = double;
[19] using vi = vector<int>;
[20] using vl = vector<ll>;
[21] using pii = pair<int, int>;
[22] using pll = pair<ll, ll>;
[23]
[24] #define all(x) x.begin(), x.end()
[25] #define cinv(x) for(auto &el: x) cin >> el;
[26] int main() {
[27]     //
[28]     freopen("input.txt", "r", stdin); freopen("output.txt", "w", stdout);
[29]     //
[30]     ios_base::sync_with_stdio(0); cin.tie(0);
[31]     vector<pll> Ps(1010);
[32]     int P = 73;
[33]     pii MODS = {100000007, 1000000000 + 1000 - 7};
[34]     Ps[0] = {1, 1};
[35]     for (int i = 1; i < 1010; ++i) {
[36]         Ps[i] = {Ps[i - 1].first * P % MODS.first, Ps[i - 1].second * P % MODS.second};
[37]     }
[38]     string s;
[39]     map<string, vector<vi>> mp;
[40]     set<string> names;
[41]     while(getline(cin, s)){
[42]         string id = "";
[43]         string now = "";
[44]         s += ",";
[45]         int step = 0;
[46]         for (int i = 0; i < s.size(); ++i) {
[47]             if (s[i] == ','){
[48]                 if (step == 0){
[49]                     mp[id].push_back(vi(0));
[50]                     names.insert(id);
[51]                 }else{
[52]                     mp[id].back().push_back((now == "OK"? 2: 1));
[53]                 }
[54]                 now = "";
[55]                 step = 1;
[56]                 continue;
[57]             }
[58]             if (step == 0){
[59]                 id += s[i];
[60]             }else{
[61]                 now += s[i];
[62]             }
[63]         }
[64]     }
[65]     for (const string & name: names) {
[66]         int maxim = 0;
[67]         for (int i = 0; i < mp[name].size(); ++i) {
[68]             maxim = max(maxim, int(mp[name][i].size()));
[69]         }
[70]         cout << maxim << " ";
[71]         set<pll> hash;
[72]         for (int i = 0; i < maxim; i++){
[73]             pll h = {0, 0};
[74]             for (int j = 0; j < mp[name].size(); j++){
[75]                 ll tmp = 1;
[76]                 if (mp[name][j].size() > i){
[77]                     tmp = mp[name][j][i];
[78]                 }
[79]                 h.first = (h.first + (tmp * Ps[j].first) % MODS.first) % MODS.first;
[80]                 h.second = (h.second + (tmp * Ps[j].second) % MODS.second) % MODS.second;
[81]             }
[82]             hash.insert(h);
[83]         }
[84]         cout << hash.size() << endl;
[85]     }
[86]     return 0;
[87] }
```