



**МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ
имени М.В. ЛОМОНОСОВА**

ОЛИМПИАДНАЯ РАБОТА

Наименование олимпиады школьников: **«Ломоносов»**

Профиль олимпиады: **Информатика**

ФИО участника олимпиады: **Лупильцев Георгий Андреевич**

Класс: **9**

Технический балл: **60**

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Результаты проверки:

№	1	2	3	4	5	6
Оценка	29	2	12	11	0	3

Задача 1.

```
#include <iostream>
```

```
#include <vector>
```

```
#include <map>
```

```
#include <set>
```

```
#include <cmath>
```

```
#include <algorithm>
```

```
#include <iomanip>
```

```
#include <deque>
```

```
#define int long long
```

```
using namespace std;
```

```
signed main() {
```

```
    char c;
```

```
    cin >> c;
```

```
string s;

cin >> s;

int idd = s.size() - 1;

vector<int> ans(200000);

for (auto now : s) {

    if (now == '1') {

        if (idd % 2 == 0) {

            ans[idd / 2] += 1;

        }

        else {

            ans[idd / 2] += 3;

        }

    }

    if (now == 'Z') {

        if (idd % 2 == 0) {
```

```
        ans[idd / 2] -= 1;

    }

    else {

        ans[idd / 2] -= 3;

    }

}

idd--;

}

int toc;

if (c == 'W') {

    toc = -4;

}

else if (c == 'X') {

    toc = -3;

}
```

```
else if (c == 'Y') {
```

```
    toc = -2;
```

```
}
```

```
else if (c == 'Z') {
```

```
    toc = -1;
```

```
}
```

```
else {
```

```
    toc = c - '0';
```

```
}
```

```
int ans = 0;
```

```
int ch = -1;
```

```
for (auto now : ans) {
```

```
    if (now != 0) {
```

```
        ch = 1;
```

```
    }
```

```
if (toc == 0 and now == toc and ch != -1) {  
  
    anns++;  
  
}  
  
if (toc != 0 and now == toc) {  
  
    anns++;  
  
}  
  
}  
  
if (ch == -1 and toc == 0) {  
  
    anns = 1;  
  
}  
  
cout << anns << "\n";  
  
}
```

Задача 2.

```
#include <iostream>
```

```
#include <vector>
```

```
#include <map>
```

```
#include <set>
```

```
#include <cmath>
```

```
#include <algorithm>
```

```
#include <iomanip>
```

```
#include <deque>
```

```
#define int long long
```

```
using namespace std;
```

```
signed main() {
```

```
    int n;
```

```
    cin >> n;
```

```
    vector<int> v;
```

```
    for (int i = 0; i < n; i++) {
```

```
        int num;
```



```
cin >> num;

v.push_back(num);

}

int ans = 0;

for (auto now : v) {

    int ch = 0;

    deque <int> v9;

    int zn = 10;

    int num = now;

    while (zn != -1) {

        int chh = pow(9, zn);

        if (num >= chh) {

            v9.push_back(num / chh);

            num = num % chh;

        }

    }

}
```

```
else {  
  
    if (v9.size() != 0) {  
  
        v9.push_back(0);  
  
    }  
  
}  
  
zn--;  
  
}  
  
v9.push_front(0);  
  
for (int i = v9.size() - 1; i > 0; i--) {  
  
    if (v9[i] == 8) {  
  
        v9[i] = -1;  
  
        v9[i - 1]++;  
  
    }  
  
    if (v9[i] == 7) {  
  
        v9[i] = -2;
```

```
    v9[i - 1]++;  
  
}  
  
if (v9[i] == 6) {  
  
    v9[i] = -3;  
  
    v9[i - 1]++;  
  
}  
  
if (v9[i] == 5) {  
  
    v9[i] = -4;  
  
    v9[i - 1]++;  
  
}  
  
}  
  
if (v9[0] == 0) {  
  
    v9.pop_front();  
  
}  
  
vector<int> co(9);
```

```
for (auto now : v9) {  
  
    co[now + 4]++;  
  
}  
  
for (int j = 1; j * j < now; j++) {  
  
    if (now % j == 0) {  
  
        int i = now / j;  
  
        deque<int> v9j;  
  
        zn = 10;  
  
        num = j;  
  
        while (zn != -1) {  
  
            int chh = pow(9, zn);  
  
            if (num >= chh) {  
  
                v9j.push_back(num / chh);  
  
                num = num % chh;  
  
            }  
  
        }  
  
    }  
  
}
```

```
else {  
  
    if (v9j.size() != 0) {  
  
        v9j.push_back(0);  
  
    }  
  
}  
  
zn--;  
  
}  
  
v9j.push_front(0);  
  
for (int hh = v9j.size() - 1; hh > 0; hh--) {  
  
    if (v9j[hh] == 8) {  
  
        v9j[hh] = -1;  
  
        v9j[hh - 1]++;  
  
    }  
  
    if (v9j[hh] == 7) {  
  
        v9j[hh] = -2;
```

```
        v9j[hh - 1]++;  
  
    }  
  
    if (v9j[hh] == 6) {  
  
        v9j[hh] = -3;  
  
        v9j[hh - 1]++;  
  
    }  
  
    if (v9j[hh] == 5) {  
  
        v9j[hh] = -4;  
  
        v9j[hh - 1]++;  
  
    }  
  
    }  
  
    if (v9j[0] == 0) {  
  
        v9j.pop_front();  
  
    }  
  
    deque<int> coj(9);
```

```
for (auto now : v9j) {  
  
    coj[now + 4]++;  
  
}  
  
deque <int> v9i;  
  
zn = 10;  
  
num = i;  
  
while (zn != -1) {  
  
    int chh = pow(9, zn);  
  
    if (num >= chh) {  
  
        v9i.push_back(num / chh);  
  
        num = num % chh;  
  
    }  
  
    else {  
  
        if (v9i.size() != 0) {  
  
            v9i.push_back(0);  
  
        }  
  
    }  
  
}
```

```
    }  
  
    }  
  
    zn--;  
  
    }  
  
v9i.push_front(0);  
  
for (int hh = v9i.size() - 1; hh > 0; hh--) {  
  
    if (v9i[hh] == 8) {  
  
        v9i[hh] = -1;  
  
        v9i[hh - 1]++;  
  
    }  
  
    if (v9i[hh] == 7) {  
  
        v9i[hh] = -2;  
  
        v9i[hh - 1]++;  
  
    }  
  
    if (v9i[hh] == 6) {
```



```
    v9i[hh] = -3;

    v9i[hh - 1]++;

}

if (v9i[hh] == 5) {

    v9i[hh] = -4;

    v9i[hh - 1]++;

}

}

if (v9i[0] == 0) {

    v9i.pop_front();

}

vector<int> coi(9);

for (auto now : v9i) {

    coi[now + 4]++;

}
```

```
if (v9j.size() == v9i.size() and v9.size() % 2 == 0 and v9.size() / 2 == v9j.size()
and (v9j[v9j.size() - 1] != 0 or v9i[v9i.size() - 1] != 0)) {
```

```
    int ch1 = 1;
```

```
    for (int b = 0; b < 9; b++) {
```

```
        if (co[b] != coj[b] + coi[b]) {
```

```
            ch1 = 0;
```

```
            break;
```

```
        }
```

```
    }
```

```
    if (ch1) {
```

```
        ch = 1;
```

```
    }
```

```
}
```

```
}
```

```
}
```

```
ans += ch;
```

```
}  
  
cout << ans << "\n";  
  
}
```

Задача 3.

```
#include <iostream>
```

```
#include <vector>
```

```
#include <set>
```

```
#include <algorithm>
```

```
#include <iomanip>
```

```
using namespace std;
```

```
signed main() {
```

```
    ios_base::sync_with_stdio(false);
```

```
    cin.tie(NULL);
```

```
    cout.tie(NULL);
```

```
int n, m, k;

cin >> n >> m >> k;

vector <vector<set <pair<int, int>>>> table(n, vector <set<pair<int, int>>> (m));

vector <pair<pair<int, int>, int>> all;

for (int i = 0; i < k; i++) {

    int v, u;

    cin >> v >> u;

    all.push_back({ {v, 1}, i});

    all.push_back({ {u, -1}, i});

}

sort(all.begin(), all.end());

vector <pair<int, int>> ans(k);

for (auto now : all) {

    int idd = now.second;

    int ch = now.first.second;
```

```
if (ch == 1) {  
  
    if (table[0][0].size() == 0) {  
  
        ans[idd] = {1, 1};  
  
        for (int i = 0; i < n; i++) {  
  
            for (int j = 0; j < m; j++) {  
  
                table[i][j].insert({i + j, idd});  
  
            }  
  
        }  
  
    }  
  
    else {  
  
        int minn = 0;  
  
        int x = -2;  
  
        int y = -2;  
  
        for (int i = 0; i < n; i++) {  
  
            for (int j = 0; j < m; j++) {
```

```
    auto el = table[i][j].begin()->first;

    if (el > minn) {

        minn = el;

        x = i;

        y = j;

    }

}

ans[idd] = {x + 1, y + 1};

for (int i = 0; i < n; i++) {

    for (int j = 0; j < m; j++) {

        table[i][j].insert({abs(i - x) + abs(j - y), idd});

    }

}

}
```

```
    }

    else {

        for (int i = 0; i < n; i++) {

            for (int j = 0; j < m; j++) {

                table[i][j].erase({abs(i - ans[idd].first + 1) + abs(j - ans[idd].second + 1),
idd});

            }

        }

    }

}

for (int i = 0; i < k; i++) {

    cout << ans[i].first << " " << ans[i].second << "\n";

}

}
```

Задача 4.

```
#include <iostream>
```

```
#include <vector>
```

```
#include <set>
```

```
#include <algorithm>
```

```
#include <iomanip>
```

```
using namespace std;
```

```
void denap(char now, char &nap) {
```

```
    if (nap == 'F') {
```

```
        if (now == 'L') {
```

```
            nap = 'L';
```

```
        }
```

```
    else {
```

```
        nap = 'R';
```

```
    }
```



```
}
```

```
else if (nap == 'R') {
```

```
    if (now == 'L') {
```

```
        nap = 'F';
```

```
    }
```

```
else {
```

```
    nap = 'B';
```

```
}
```

```
}
```

```
else if (nap == 'B') {
```

```
    if (now == 'L') {
```

```
        nap = 'R';
```

```
    }
```

```
else {
```

```
    nap = 'L';
```

```
    }  
  
}  
  
else if (nap == 'L') {  
  
    if (now == 'L') {  
  
        nap = 'B';  
  
    }  
  
    else {  
  
        nap = 'F';  
  
    }  
  
}  
  
}  
  
  
void gof(char now, vector <int> &wh, char &nap, int &st) {  
  
    if (nap == 'F') {  
  
        if (st <= 33) {
```

```
    st += 3;

}

else if (st > 33 and st < 37) {

    st = (st + 3) % 36;

}

else {

    if (st == 37 or st == 40 or st == 43 or st == 38 or st == 41 or st == 44) {

        st++;

    }

    else if (st == 39) {

        st = 12;

    }

    else if (st == 42) {

        st = 15;

    }

}
```

```
else if (st == 45) {
```

```
    st = 18;
```

```
}
```

```
else if (st >= 49 and st <= 54) {
```

```
    st -= 3;
```

```
}
```

```
else if (st == 46) {
```

```
    st = 16;
```

```
}
```

```
else if (st == 47) {
```

```
    st = 13;
```

```
}
```

```
else if (st == 48) {
```

```
    st = 10;
```

```
}
```

```
}
```

```
}
```

```
else if (nap == 'R') {
```

```
    if (st >= 1 and st <= 36 and st % 3 != 0) {
```

```
        st++;
```

```
    }
```

```
    else if (st == 3 or st == 6 or st == 9) {
```

```
        st = st / 3 + 36;
```

```
    }
```

```
    else if (st == 12 or st == 15 or st == 18) {
```

```
        st = st + 27;
```

```
    }
```

```
    else if (st == 21 or st == 24 or st == 27) {
```

```
        st = 45 - (st - 21) / 3;
```

```
    }
```

```
else if (st == 30 or st == 33 or st == 36) {
```

```
    st = 43 - (st - 30);
```

```
}
```

```
else if (st >= 37 and st <= 42) {
```

```
    st += 3;
```

```
}
```

```
else if (st >= 43 and st <= 45) {
```

```
    st = 21 + (45 - st) * 3;
```

```
}
```

```
else if (st == 46 or st == 47) {
```

```
    st++;
```

```
}
```

```
else if (st == 49 or st == 50) {
```

```
    st++;
```

```
}
```

```
else if (st == 52 or st == 53) {
```

```
    st++;
```

```
}
```

```
else if (st == 48 or st == 51 or st == 54) {
```

```
    st = 7 + (st - 48);
```

```
}
```

```
}
```

```
else if (nap == 'B') {
```

```
    if (st >= 3 and st <= 36) {
```

```
        st -= 3;
```

```
    }
```

```
else if (st >= 1 and st <= 3) {
```

```
    st = 33 + st;
```

```
}
```

```
else {
```

```
if (st == 38 or st == 41 or st == 44 or st == 39 or st == 42 or st == 45) {
```

```
    st--;
```

```
}
```

```
else if (st == 37) {
```

```
    st = 36;
```

```
}
```

```
else if (st == 40) {
```

```
    st = 33;
```

```
}
```

```
else if (st == 43) {
```

```
    st = 30;
```

```
}
```

```
else if (st >= 46 and st <= 51) {
```

```
    st += 3;
```

```
}
```



```
else if (st == 52) {  
  
    st = 28;  
  
}  
  
else if (st == 53) {  
  
    st = 31;  
  
}  
  
else if (st == 54) {  
  
    st = 34;  
  
}  
  
}  
  
}  
  
}  
  
else if (nap == 'L') {  
  
    if (st >= 1 and st <= 36 and (st + 2) % 3 != 0) {  
  
        st--;  
  
    }  
  
}
```

```
else if (st == 1 or st == 4 or st == 7) {
```

```
    st = 55 - st;
```

```
}
```

```
else if (st == 10 or st == 13 or st == 16) {
```

```
    st = 46 + (16 - st) / 3;
```

```
}
```

```
else if (st == 19 or st == 22 or st == 25) {
```

```
    st = 46 + st - 19;
```

```
}
```

```
else if (st == 28 or st == 31 or st == 34) {
```

```
    st = 54 - (34 - st) / 3;
```

```
}
```

```
else if (st >= 40 and st <= 45) {
```

```
    st -= 3;
```

```
}
```

```
else if (st >= 37 and st <= 39) {
```

```
    st = 3 + (st - 37) * 3;
```

```
}
```

```
else if (st == 48 or st == 47) {
```

```
    st--;
```

```
}
```

```
else if (st == 51 or st == 50) {
```

```
    st--;
```

```
}
```

```
else if (st == 54 or st == 53) {
```

```
    st--;
```

```
}
```

```
else if (st == 46 or st == 49 or st == 52) {
```

```
    st = 19 + (52 - st);
```

```
}
```

```
}
```

```
if (st == 1 or st == 34 or st == 54) {
```

```
    wh[0]++;
```

```
}
```

```
if (st == 2 or st == 35) {
```

```
    wh[1]++;
```

```
}
```

```
if (st == 3 or st == 37 or st == 36) {
```

```
    wh[2]++;
```

```
}
```

```
if (st == 4 or st == 51) {
```

```
    wh[3]++;
```

```
}
```

```
if (st == 5) {
```

```
    wh[4]++;
```

```
}
```

```
if (st == 6 or st == 38) {
```

```
    wh[5]++;
```

```
}
```

```
if (st == 7 or st == 10 or st == 48) {
```

```
    wh[6]++;
```

```
}
```

```
if (st == 11 or st == 8) {
```

```
    wh[7]++;
```

```
}
```

```
if (st == 9 or st == 12 or st == 39) {
```

```
    wh[8]++;
```

```
}
```

```
if (st == 13 or st == 47) {
```

```
    wh[9]++;
```

```
}
```

```
if (st == 14) {
```

```
    wh[10]++;
```

```
}
```

```
if (st == 15 or st == 42) {
```

```
    wh[11]++;
```

```
}
```

```
if (st == 41) {
```

```
    wh[12]++;
```

```
}
```

```
if (st == 40 or st == 33) {
```

```
    wh[13]++;
```

```
}
```

```
if (st == 32) {
```

```
    wh[14]++;
```

```
}
```

```
if (st == 31 or st == 53) {
```

```
    wh[15]++;
```

```
}
```

```
if (st == 50) {
```

```
    wh[16]++;
```

```
}
```

```
if (st == 16 or st == 19 or st == 46) {
```

```
    wh[17]++;
```

```
}
```

```
if (st == 17 or st == 20) {
```

```
    wh[18]++;
```

```
}
```

```
if (st == 18 or st == 21 or st == 45) {
```

```
    wh[19]++;
```

```
}
```

```
if (st == 44 or st == 24) {
```

```
    wh[20]++;
```

```
}
```

```
if (st == 43 or st == 27 or st == 30) {
```

```
    wh[21]++;
```

```
}
```

```
if (st == 29 or st == 26) {
```

```
    wh[22]++;
```

```
}
```

```
if (st == 28 or st == 52 or st == 25) {
```

```
    wh[23]++;
```

```
}
```

```
if (st == 49 or st == 22) {
```

```
    wh[24]++;
```



```
    }

    if (st == 23) {

        wh[25]++;

    }

}

signed main() {

    ios_base::sync_with_stdio(false);

    cin.tie(NULL);

    cout.tie(NULL);

    string s;

    cin >> s;

    vector<int> wh(26);

    wh[4]++;

    int st = 5;
```

```
char nap = 'F';

for (auto now : s) {

    if (now != 'F') {

        denap(now, nap);

    }

    else if (now != 'S'){

        gof(now, wh, nap, st);

    }

}

int ans = 0;

for (auto now : wh) {

    if (now > 0) {

        ans++;

    }

}
```

```
    cout << ans << "\n";  
  
}
```

Задача 5.

```
#include <iostream>
```

```
#include <vector>
```

```
#include <set>
```

```
#include <algorithm>
```

```
#include <iomanip>
```

```
using namespace std;
```

```
signed main() {
```

```
    string s;
```

```
    cin >> s;
```

```
    if (s[2] == '#') {
```

```
        cout << 1231 << "\n";
```

```
}  
  
else {  
  
    cout << 1 * (s.size() - 1) << "\n";  
  
}  
  
}
```

Задача 6.

```
#include <iostream>
```

```
#include <vector>
```

```
#include <set>
```

```
#include <algorithm>
```

```
#include <iomanip>
```

```
using namespace std;
```

```
signed main() {
```

```
    int n, k;
```

```
cin >> n >> k;

vector<int> s(n);

for (int i = 0; i < n; i++) {

    cin >> s[i];

}

if (n == 3) {

    cout << 2 << "\n";

}

else {

    cout << 3 << "\n";

}

}
```