



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

**ОЛИМПИАДНАЯ РАБОТА**

Наименование олимпиады школьников: **«Ломоносов»**

Профиль олимпиады: **Информатика**

ФИО участника олимпиады: **Бобков Артём Алексеевич**

Класс: **9**

Технический балл: **65**

Дата проведения: **09 марта 2021 года**

**Результаты проверки:**

№	1	2	3	4	5	6
Оценка	33	2	1	14	13	0

## Задача 1.

```
#include <iostream>
```

```
#include <string>
```

```
#include <algorithm>
```

```
using namespace std;
```

```
int main() {
```

```
    ios_base::sync_with_stdio(0);
```

```
    cin.tie(0);
```

```
    cout.tie(0);
```

```
    char c;
```

```
    cin >> c;
```

```
    int fnd;
```

```
    if (c >= '0' && c <= '9') {
```

```
        fnd = c - '0';
```

```
}  
  
else {  
  
    fnd = int(c) - int('Z') - 1;  
  
}  
  
string s;  
  
cin >> s;  
  
reverse(s.begin(), s.end());  
  
int i;  
  
for (i = s.size() - 1; i > 0; --i) {  
  
    if (s[i] != '0') {  
  
        break;  
  
    }  
  
}  
  
s.resize(i + 1);  
  
int ans = 0;
```

```
for (i = 0; i < s.size() - 1; i += 2) {  
  
    int cur = 0;  
  
    if (s[i] >= '0' && s[i] <= '9') {  
  
        cur += s[i] - '0';  
  
    }  
  
    else {  
  
        cur += s[i] - 'Z' - 1;  
  
    }  
  
    if (s[i + 1] >= '0' && s[i + 1] <= '9') {  
  
        cur += (s[i + 1] - '0') * 3;  
  
    }  
  
    else {  
  
        cur += (s[i + 1] - 'Z' - 1) * 3;  
  
    }  
  
    if (cur == fnd) {
```

```
        ++ans;

    }

}

if (i == s.size() - 1) {

    int last = 0;

    if (s[i] >= '0' && s[i] <= '9') {

        last = s[i] - '0';

    }

    else {

        last = s[i] - 'Z' - 1;

    }

    if (last == fnd) {

        ++ans;

    }

}

}
```

```
    cout << ans;

    return 0;

}
```

## **Задача 2.**

```
#include <iostream>
```

```
#include <vector>
```

```
using namespace std;
```

```
int main() {
```

```
    ios_base::sync_with_stdio(0);
```

```
    cin.tie(0);
```

```
    cout.tie(0);
```

```
    int n;
```

```
    cin >> n;
```

```
    int ans = 0;
```

```
for (int i = 0; i < n; ++i) {  
  
    int el;  
  
    cin >> el;  
  
    if (el != 9 && el % 9 == 0 && el % 81 != 0) {  
  
        ++ans;  
  
    }  
  
}  
  
cout << ans;  
  
return 0;  
  
}
```

### **Задача 3.**

```
#include <iostream>
```

```
#include <vector>
```

```
#include <algorithm>
```

```
using namespace std;
```



```
int main() {

    ios_base::sync_with_stdio(0);

    cin.tie(0);

    cout.tie(0);

    vector<pair<int, int> > v;

    int n, m, k;

    cin >> n >> m >> k;

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

        int b, e;

        cin >> b >> e;

        v.push_back({ b, -1 });

        v.push_back({ e, 1 });

    }

    sort(v.begin(), v.end());
```

```
int bal = 0, mx = 0;

for (auto& i : v) {

    bal += i.second;

    if (bal < mx) {

        mx = bal;

    }

}

mx *= -1;

vector<pair<int, int>> pl = { {0, 0} };

for (int i = 1; i < k; ++i) {

    int mx = 0;

    int f = -2, s = -2;

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

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

            int lmn = n + m;
```

```
for (auto& j : pl) {  
  
    int d = abs(j.first - x) + abs(j.second - y);  
  
    if (d < lmn) {  
  
        lmn = d;  
  
    }  
  
}  
  
if (lmn > mx) {  
  
    mx = lmn;  
  
    f = x;  
  
    s = y;  
  
}  
  
}  
  
}  
  
if (mx == 0) {  
  
    pl.push_back({ -2, -2 });  
  
}
```

```
    }

    else {

        pl.push_back({ f, s });

    }

}

bal = -1;

for (auto& i : v) {

    bal -= i.second;

    if (i.second == -1) {

        cout << pl[bal].first + 1 << ' ' << pl[bal].second + 1 << '\n';

    }

}

return 0;

}
```

#### **Задача 4.**

```
#include <iostream>
```

```
#include <vector>
```

```
using namespace std;
```

```
int dir = 0;
```

```
void turn(int x) {
```

```
    dir += x;
```

```
    if (dir < 0) {
```

```
        dir += 4;
```

```
    }
```

```
    else if (dir > 3) {
```

```
        dir -= 4;
```

```
    }
```

```
}
```

```
int main() {
```

```
    ios_base::sync_with_stdio(0);
```

```
    cin.tie(0);
```

```
    cout.tie(0);
```

```
    vector<char> c(26, false);
```

```
    vector<vector<int>> m = {
```

```
        {0, 1, 2},
```

```
        {3, 4, 5},
```

```
        {6, 7, 8},
```

```
        {6, 7, 8},
```

```
        {9, 10, 11},
```

```
        {12, 13, 14},
```

{12, 13, 14},

{15, 16, 17},

{18, 19, 20},

{18, 19, 20},

{21, 22, 23},

{0, 1, 2}

};

vector<vector<int>> l = {

{6, 9, 12},

{3, 24, 15},

{0, 21, 18}

};

vector<vector<int>> r = {

```
{14, 11, 8},
```

```
{17, 25, 5},
```

```
{20, 23, 2}
```

```
};
```

```
int x = 7, y = 1;
```

```
char f = 'm';
```

```
c[m[x][y]] = true;
```

```
char C = getchar();
```

```
while (C != 'S') {
```

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

```
        turn(-1);
```

```
    }
```

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

```
        turn(1);
```

```
    }
```



```
else {  
  
    switch (dir) {  
  
        case 0:  
  
            --x;  
  
            break;  
  
        case 1:  
  
            ++y;  
  
            break;  
  
        case 2:  
  
            ++x;  
  
            break;  
  
        case 3:  
  
            --y;  
  
            break;  
  
    }  
}
```

```
if (f == 'm') {  
  
    if (x < 0) {  
  
        x += m.size();  
  
    }  
  
    else if (x >= m.size()) {  
  
        x = 0;  
  
    }  
  
    if (y < 0) {  
  
        f = 'l';  
  
        ++y;  
  
        if (x < 3) {  
  
            turn(-2);  
  
            x = 2 - x;  
  
        }  
  
        else if (x < 6) {
```

```
turn(-1);
```

```
x %= 3;
```

```
swap(x, y);
```

```
}
```

```
else if (x < 9) {
```

```
    y = 2 - y;
```

```
}
```

```
else {
```

```
    turn(1);
```

```
x %= 3;
```

```
x = 2 - x;
```

```
y = 2 - y;
```

```
swap(x, y);
```

```
}
```

```
}
```

```
else if (y >= 3) {  
  
    f = 'r';  
  
    --y;  
  
    if (x < 3) {  
  
        turn(2);  
  
        x = 2 - x;  
  
    }  
  
    else if (x < 6) {  
  
        turn(1);  
  
        x %= 3;  
  
        x = 2 - x;  
  
        y = 2 - y;  
  
        swap(x, y);  
  
    }  
  
    else if (x < 9) {
```

```
        y = 2 - y;

    }

    else {

        turn(-1);

        x %= 3;

        swap(x, y);

    }

}

else if (f == 'l') {

    if (x < 0) {

        f = 'm';

        ++x;

        turn(1);

        swap(x, y);
```

```
        x += 3;

    }

    else if (x >= 3) {

        f = 'm';

        --x;

        turn(-1);

        x = 2 - x;

        y = 2 - y;

        swap(x, y);

        x += 9;

    }

    else if (y < 0) {

        f = 'm';

        ++y;

        turn(2);
```

```
        x = 2 - x;

    }

    else if (y >= 3) {

        f = 'm';

        --y;

        y = 2 - y;

        x += 6;

    }

}

else {

    if (x < 0) {

        f = 'm';

        ++x;

        turn(-1);

        x = 2 - x;
```

```
y = 2 - y;
```

```
swap(x, y);
```

```
x += 3;
```

```
}
```

```
else if (x >= 3) {
```

```
    f = 'm';
```

```
    --x;
```

```
    turn(1);
```

```
    swap(x, y);
```

```
}
```

```
else if (y < 0) {
```

```
    f = 'm';
```

```
    ++y;
```

```
    y = 2 - y;
```

```
    x += 6;
```



```
    }  
  
    else if (y >= 3) {  
  
        f = 'm';  
  
        --y;  
  
        turn(-2);  
  
        x = 2 - x;  
  
    }  
  
    }  
  
}  
  
if (f == 'm') {  
  
    c[m[x][y]] = true;  
  
    }  
  
else if (f == 'l') {  
  
    c[l[x][y]] = true;  
  
    }
```

```
        else {  
  
            c[r[x][y]] = true;  
  
        }  
  
        C = getchar();  
  
    }  
  
    int ans = 0;  
  
    for (auto& i : c) {  
  
        if (i) {  
  
            ++ans;  
  
        }  
  
    }  
  
    cout << ans;  
  
    return 0;  
  
}
```

### **Задача 5.**

```
#include <iostream>
```

```
#include <string>
```

```
#include <algorithm>
```

```
using namespace std;
```

```
int main() {
```

```
    ios_base::sync_with_stdio(0);
```

```
    cin.tie(0);
```

```
    cout.tie(0);
```

```
    string s;
```

```
    cin >> s;
```

```
    string srt = s;
```

```
    sort(srt.begin(), srt.end());
```

```
    string ans;
```

```
    ans.resize(s.size() - 1, '-');
```

```
for (int i = 0; i < s.size(); ++i) {  
  
    if (srt[i] == '#') {  
  
        ans.back() = s[i];  
  
    }  
  
    else if (s[i] == '#') {  
  
        ans[0] = srt[i];  
  
    }  
  
    else {  
  
        for (int j = ans.size() - 1; j > 0; --j) {  
  
            if (ans[j] == srt[i] && ans[j - 1] == '-') {  
  
                ans[j - 1] = s[i];  
  
                break;  
  
            }  
  
        }  
  
    }  
  
}
```

```
}  
  
cout << ans;  
  
return 0;  
  
}
```