

Олимпиада СПбГУ по информатике 2022/23 учебного года

A	B	C	D	E	F	Sum
100	100	80	60	28	10	378

Task A ()

```
#include <iostream>
#include <set>
#include <vector>

using namespace std;

int main() {
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
    int n = 6;
    vector<int> d(n, -1);
    for (int i = 0; i < n; ++i) {
        int x; cin >> x;
        for (int j = 0; j < n; ++j) {
            if (d[j] >= x) {
                d[j]++;
            }
        }
        d[i] = x;
    }
    for (int i = 0; i < n; ++i) {
        cout << d[i] << " ";
    }
}
```

Task B ()

```
#include <iostream>
#include <vector>

#define int long long

using namespace std;

const int p = 1e7;

void fir() {
    int n, m = 0; cin >> n;
    vector<int> a(n);
    for (int i = 0; i < n; ++i) {
        cin >> a[i];
        m += a[i];
    }
    cout << m * p;
    return;
}

void sec() {
    int n, m = 0; cin >> n;
    vector<int> b(n);
    for (int i = 0; i < n; ++i) {
        cin >> b[i];
        m += b[i] % p;
    }

    cout << b[0] / p + m;
    return;
}

signed main() {
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
    string s; cin >> s;
    if (s == "first") fir();
    else sec();
    return 0;
}
```

Task C ()

```
#include <iostream>
#include <vector>
#include <map>
#include <set>
#include <algorithm>

// #define int long long

using namespace std;

struct box { int x, y; };
set <pair <int, int>> q;

void add(int x, int y) {
    if (x <= 0 || y <= 0) return;
    if (x > y) swap(x, y);
    q.insert({ x, y });
}

void f1(box a, box b) {
    if (a.x > b.x || a.y > b.y) return;
    if (a.x == b.x) {
        add(b.x, b.y - a.y);
    }
    if (a.y == b.y) {
        add(b.y, b.x - a.x);
    }
}

void f2(box a, box b, box c) {
    if (a.x > c.x || a.y > c.y || b.x > c.x || b.y > c.y) return;
    if (b.x == a.x && a.y + b.y == c.y) {
        add(c.x - a.x, c.y);
    }
    if (a.y == b.y && a.x + b.x == c.x) {
        add(c.y - a.y, c.x);
    }
    if (a.x + b.x == c.x && a.y + b.y == c.y) {
        add(a.y, b.x);
        add(a.x, b.y);
    }
    if (b.y > c.y - a.y && a.x + b.x <= c.x && b.y <= c.y) {
        add(a.x, c.y - a.y);
        if (a.x + b.x == c.x) {
            add(b.x, c.y - b.y);
        }
        if (b.y == c.y) {
            add(c.y, c.x - a.x - b.x);
        }
    }
    if (b.x > c.x - a.x && a.y + b.y <= c.y && b.x <= c.x) {
        add(a.y, c.x - a.x);
        if (a.y + b.y == c.y) {
            add(b.y, c.x - b.x);
        }
        if (b.x == c.x) {
            add(c.x, c.y - a.y - b.y);
        }
    }
    if (a.x == c.x && b.x == c.x) {
        add(c.x, c.y - a.y - b.y);
    }
    if (a.y == c.y && b.y == c.y) {
        add(c.y, c.x - a.x - b.x);
    }
}

void calc1(box a, box b) {
    f1(a, b); f1(b, a);
    swap(a.x, a.y);
    f1(a, b); f1(b, a);
    swap(a.x, a.y);
}
```

```

    swap(b.x, b.y);
    f1(a, b); f1(b, a);
    swap(a.x, a.y);
    f1(a, b); f1(b, a);
}

void calc2(box a, box b, box c) {
    f2(a, b, c); f2(b, a, c);
    swap(a.x, a.y);
    f2(a, b, c); f2(b, a, c);
    swap(a.x, a.y);
    swap(b.x, b.y);
    f2(a, b, c); f2(b, a, c);
    swap(a.x, a.y);
    f2(a, b, c); f2(b, a, c);
}

signed main() {
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
    box a, b, c;
    cin >> a.x >> a.y >> b.x >> b.y >> c.x >> c.y;
    add(a.x, a.y); add(b.x, b.y); add(c.x, c.y);
    calc1(a, b); calc1(a, c); calc1(b, c);
    calc2(a, b, c); swap(c.x, c.y); calc2(a, b, c); swap(c.x, c.y);
    calc2(b, c, a); swap(a.x, a.y); calc2(b, c, a); swap(a.x, a.y);
    calc2(a, c, b); swap(b.x, b.y); calc2(a, c, b); swap(b.x, b.y);
    while (q.size()) {
        auto a = *q.begin();
        q.erase(q.begin());
        cout << a.first << " " << a.second << '\n';
    }
    return 0;
}

```

Task D ()

```
#include <iostream>
#include <vector>
#include <map>
#include <set>
#include <algorithm>
#include <cassert>

// #define int long long

using namespace std;

int n;
vector<int> a, b;
vector<int> used;

void f1() {
    while (1) {
        if (b[0] > 0) {
            cout << 1 << "┘" << b[0] << '\n';
            cout.flush();
        }
        else if (!used[0]) {
            cout << "1┘\n";
            cout.flush();
        }
        else {
            cout << "-1┘-1";
            break;
        }
        int x, y; cin >> x >> y;
        if (x + y == -2) break;
        if (y == 0) b[x - 1] = a[x - 1];
        else b[x - 1] -= y;
    }
}

void f2() {
    if (a[0] == a[1]) {
        cout << "-1┘-1";
        return;
    }
    if (a[0] > a[1]) {
        cout << "1┘" << a[0] - a[1] << '\n';
        cout.flush();
    }
    else {
        cout << "2┘" << a[1] - a[0] << '\n';
        cout.flush();
    }
    while (a[0] + a[1] > 0) {
        int x, y; cin >> x >> y;
        if (x == -1) return;
        if (x == 1) {
            cout << "2┘" << y << '\n';
        }
        else {
            cout << "1┘" << y << '\n';
        }
        if (y == 0) {
            used[0] = 1; used[1] = 1;
        }
        else {
            a[0] -= y;
            a[1] -= y;
        }
        cout.flush();
    }
}

signed main() {
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
    cin >> n;
```

```

    a.resize(n); b.resize(n);
    used.resize(n, 0);
    for (int i = 0; i < n; ++i) {
        cin >> a[i];
        b[i] = a[i];
    }
    if (n == 1) f1();
    else f2();
    return 0;
}

#include <iostream>
#include <vector>
#include <map>
#include <algorithm>

// #define int long long

using namespace std;

const int n = 10;
int H = 0;
map <pair <int, int>, int > M;
map <int, pair <int, int> > _M;

vector <int> h(n, 0);
vector <vector <int> > sms(200);
map <vector <int>, int > hsh;

void f(int k, int p = 0) {
    if (k == 10) {
        hsh[h] = H;
        int kk = 0;
        for (int i = 0; i < n; ++i) kk += h[i];
        sms[kk].push_back(H++);
        return;
    }
    for (int i = p; i <= 10; ++i) {
        h[k] = i;
        f(k + 1, i);
    }
}

void fir() {
    int x; cin >> x;
    vector <vector <char> > c(n, vector <char>(n, '0'));
    vector <int> k = _M[x];
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < k[i]; ++j) {
            c[i][j] = '1';
        }
    }
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < n; ++j) cout << c[i][j];
        cout << '\n';
    }
    return;
}

void sec() {
    vector <vector <char> > c(n, vector <char>(n));
    vector <int> k;
    for (int i = 0; i < n; ++i) {
        int x = 0;
        for (int j = 0; j < n; ++j) {
            cin >> c[i][j];
            if (c[i][j] == '1') x++;
        }
        k.push_back(x);
    }
    sort(k.begin(), k.end());
    cout << M[k] << '\n';
    return;
}

```

```

}

void calc() {
    int x = 1;
    for (int ln = 0; ln < 101; ++ln) {
        int sz = sms[ln].size();
        cout << ln << ' ' << sz << '\n';
        for (int i = 0; i < sz; ++i) {
            for (int j = 0; j < sz; ++j) {
                M[ {sms[ln][i], sms[ln][j]} ] = x;
                _M[x] = { sms[ln][i], sms[ln][j] };
                x++;
            }
        }
        cout << x;
    }
}

signed main() {
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
    f(0, 0);
    calc();
    int t; cin >> t;
    string s; cin >> s;
    while (t--) {
        if (s == "transmit") fir();
        else sec();
    }
    return 0;
}*/

```

Task E ()

```
#include <iostream>
#include <vector>
#include <map>
#include <algorithm>

// #define int long long

using namespace std;

const int n = 10;
int ans = 1;
map <vector <int>, int > M;
map <int, vector <int> > _M;

vector <int> h(n, 0);

void f(int k, int p = 0) {
    if (k == 10) {
        M[h] = ans;
        _M[ans] = h;
        ans++;
        return;
    }
    for (int i = p; i <= 10; ++i) {
        h[k] = i;
        f(k + 1, i);
    }
}

void fir() {
    int x; cin >> x;
    vector <vector <char> > c(n, vector <char>(n, '0'));
    vector <int> k = _M[x];
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < k[i]; ++j) {
            c[i][j] = '1';
        }
    }
    for (int i = 0; i < n; ++i) {
        for (int j = 0; j < n; ++j) cout << c[i][j];
        cout << '\n';
    }
    return;
}

void sec() {
    vector <vector <char> > c(n, vector <char>(n));
    vector <int> k;
    for (int i = 0; i < n; ++i) {
        int x = 0;
        for (int j = 0; j < n; ++j) {
            cin >> c[i][j];
            if (c[i][j] == '1') x++;
        }
        k.push_back(x);
    }
    sort(k.begin(), k.end());
    cout << M[k] << '\n';
    return;
}

signed main() {
    ios_base::sync_with_stdio(false); cin.tie(0); cout.tie(0);
    f(0, 0);
    int t; cin >> t;
    string s; cin >> s;
    while (t--) {
        if (s == "transmit") fir();
        else sec();
    }
    return 0;
}
```


Task F ()

```
s1 = []
s2 = []
a = input()
b = input()
x = ""
n = ""
for i in a:
    if i == '(':
        x += '('
    elif i == ')':
        d = x[1:].split('|')
        n += d[0] * int(d[1])
        x = ""
    else:
        if x == "":
            n += i
        else:
            x += i

x = ""
m = ""
for i in b:
    if i == '(':
        x += '('
    elif i == ')':
        d = x[1:].split('|')
        m += d[0] * int(d[1])
        x = ""
    else:
        if x == "":
            m += i
        else:
            x += i

n = int(n)
m = int(m)
print(n + m)
```