

# Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	80	58	0	438

## Task A ()

```
#include <bits/stdc++.h>
using namespace std;
#define int long long
#define double long double
//mt19937 rnd(1337);
const int mod = 1e9 + 7;
const int inf = 1e18;
const double pi = acos(-1);

signed main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    int n;
    cin >> n;
    priority_queue < pair<int, int>, vector < pair<int, int>>, greater<pair<int, int>>> q;
    for (int i = 0; i < n; i++) {
        int a, b;
        cin >> a >> b;
        while (a % 10 == 0) {
            b = b + 1;
            a = a / 10;
        }
        q.push({ b, a });
    }
    while (q.size() != 1) {
        pair<int, int> now = q.top();
        q.pop();
        if (q.top().first == now.first) {
            pair<int, int> now2 = q.top();
            q.pop();
            now.second = now.second + now2.second;
            while (now.second % 10 == 0) {
                now.first++;
                now.second = now.second / 10;
            }
            q.push(now);
        }
        else {
            q.push(now);
            break;
        }
    }
    cout << q.top().first;
}
```

## Task B ()

```
#include <bits/stdc++.h>
using namespace std;
#define int long long
#define double long double
//mt19937 rnd(1337);
const int mod = 1e9 + 7;
const int inf = 1e18;
const double pi = acos(-1);

const string f = "Flip_and_wait", w = "Wait";

vector<int> t;
int n;

int score(string& s) {
    return (s.size() - 3) / 2;
}

void upd(string& s, int now) {
    int kol = score(s);
    for (int i = 0; i < n; i++) {
        if (t[i] == -1) {
            t[i] = now;
            kol--;
        }
        if (kol == 0) {
            break;
        }
    }
}

signed main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    string cmd;
    cin >> n;
    t.resize(n, -1);
    queue<int> q;
    stack<int> zp;
    vector<int> k(n);
    for (int i = 0; i < n; i++) {
        int a;
        cin >> a;
        k[i] = a;
        if (a != 0) {
            zp.push(i);
            q.push(i);
        }
    }
    int nowtime = 1;
    cout << f << endl;
    int num;
    while (true) {
        cin >> cmd;
        upd(cmd, nowtime);
        while (!q.empty() && t[q.front()] != -1) {
            q.pop();
        }
        if (q.empty()) {
            break;
        }
        cout << w << endl;
        nowtime++;
    }
    k[zp.top()]--;
    while (!zp.empty()) {
        int num = zp.top();
        zp.pop();
        for (int i = 0; i < k[num]; i++) {
            cout << f << endl;
            cin >> cmd;
            for (int j = 1; j < t[num]; j++) {
```

```
        cout << w << endl;
        cin >> cmd;
    }
}
cout << "Stop";
}
```

## Task C ()

```
#include <bits/stdc++.h>
using namespace std;
#define int long long
#define double long double
//mt19937 rnd(1337);
const int mod = 1e9 + 7;
const int inf = 1e18;
const double pi = acos(-1);

void solve1(int n) {
    for (int i = 0; i < n / 2; i++) {
        cout << "?";
    }
    for (int i = n / 2; i < n; i++) {
        cout << "1";
    }
    cout << "\n";
}

void solve2(int n) {
    for (int i = 0; i < n; i++) {
        cout << "1";
    }
    cout << "\n";
}

signed main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    map<string, string> mp;
    int n;
    cin >> n;
    for (int num = 0; num < n; num++) {
        string s;
        cin >> s;
        int score1 = 0, score0 = 0, scorevp = 0;
        for (int i = 0; i < s.size(); i++) {
            if (s[i] == '1') {
                score1++;
            }
            if (s[i] == '0') {
                score0++;
            }
            if (s[i] == '?') {
                scorevp++;
            }
        }
        if (scorevp != 0) {
            char c;
            if (score1 == s.size() / 2 + (s.size() % 2)) {
                solve2(s.size());
                continue;
            }
            if (score0 == 0) {
                c = '0';
            }
            else {
                c = '1';
            }
            for (int i = 0; i < s.size(); i++) {
                if (s[i] == '?') {
                    cout << c;
                }
                else {
                    cout << s[i];
                }
            }
            cout << endl;
        }
        else {
            char c;
            if (score1 == s.size()) {
```

```

        solve1(score1);
        continue;
    }
    if (score1 >= score0) {
        c = '1';
    }
    else {
        c = '0';
    }
    for (int i = 0; i < s.size(); i++) {
        if (s[i] == c) {
            cout << '?';
        }
        else {
            cout << s[i];
        }
    }
    cout << endl;
}
}
}

```

## Task D ()

```
#include <bits/stdc++.h>
using namespace std;
#define int long long
const int mod = 998244353;
const int inf = 1e8;

signed main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    int A[10] = {};
    A[0] = 1;
    A[1] = 980201571;
    A[2] = 468660588;
    A[3] = 478389955;
    A[4] = 137136996;
    A[5] = 203730522;
    A[6] = 533107751;
    A[7] = 496409701;
    A[8] = 637333574;
    A[9] = 465585441;
    int n;
    cin >> n;
    int sc = n / inf;
    int p = A[sc];
    int st = sc * inf + 1;
    for (int i = st; i <= n; i++) {
        p = (p * (i + 1));
        if (p >= mod) {
            p = p % mod;
        }
    }
    cout << 0 << "_" << p;
}
/*
100000000 980201571
200000000 468660588
300000000 478389955
400000000 137136996
500000000 203730522
600000000 533107751
700000000 496409701
800000000 637333574
900000000 465585441
*/
```

## Task E ()

```
#include <bits/stdc++.h>
using namespace std;
#define int long long
const int mod = 998244353;
const int inf = 1e8;

int n;
vector<int> v;

void solve() {
    int a, b, c;
    cin >> a >> b >> c;
    vector<int> t(n);
    int ans = 0;
    for (int i = a; i < b; i++) {
        int plus = c / v[i];
        if (c % v[i] != 0) {
            plus++;
        }
        ans = ans + plus;
    }
    cout << ans << "\n";
}

signed main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    cin >> n;
    v.resize(n);
    for (int i = 0; i < n; i++) {
        cin >> v[i];
    }
    int q;
    cin >> q;
    while (q--) {
        solve();
    }
}
```

## Task F ()

```
#include<bits/stdc++.h>
using namespace std;
#define int long long
signed main() {
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    int n;
    cin >> n;
    vector<pair<int, int>> v(n);
    for (int i = 0; i < n; i++) {
        cin >> v[i].first >> v[i].second;
    }
    int ans = 1;
    for (int s = -20001; s <= 20001; s++) {
        int now = 0;
        int score = 0;
        if (s == 0) {
            score++;
        }
        for (int i = 0; i < n; i++) {
            int r = s - now;
            if (v[i].first <= r && r <= v[i].second) {
                score++;
                now = s;
            }
            else {
                if (abs(s - (now + v[i].first)) > abs(s - (now + v[i].second))) {
                    now = now + v[i].second;
                }
                else {
                    now = now + v[i].first;
                }
            }
        }
        ans = max(score, ans);
    }
    cout << ans;
}
```