Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	60	58	31	449

Task A ()

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long ll;
#define vi vector<int>
#define pi pair<int, int>
#define pll pair<ll, ll>

struct num {
    ll a, b;

    num(ll x, ll y) {
        a = x;
        b = y;
    }

    bool operator<(const num &other) const {
        return b < other.b;
    }
};

void solve() {
    int n;
    cin >> n;
    multiset<num> nums;
    for (int i = 0; i < n; i++) {
        ll a, b;
        cin >> a >> b;
        while (a % 10 == 0) {
            b++;
            a /= 10;
        }
        nums.insert(num(a, b));
    }
    while (nums.size() > 1) {
        auto first = nums.begin();
        num a = *first;
        first++;
        num b = *first;
        if (a.b != b.b) break;
        ll c = a.b;
        ll res = a.a + b.a;
        while (res % 10 == 0) {
            c++;
            res /= 10;
        }
        nums.erase(nums.begin());
        nums.erase(nums.begin());
        nums.insert(num(res, c));
    }
    cout << nums.begin()->b << '\n';
}

signed main() {
    ios::sync_with_stdio(false);
```

```cpp
    cin.tie(nullptr);
    int tests = 1;
    // cin >> tests;
    while (tests--) {
        solve();
    }
}
```

Task B ()

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long ll;
#define vi vector<int>
#define pi pair<int, int>
#define pll pair<ll, ll>

void flip_and_wait() {
    cout << "Flip_and_wait" << endl;
}

void wait() {
    cout << "Wait" << endl;
}

void stop() {
    cout << "Stop" << endl;
}

int get_amount() {
    string line;
    cin >> line;
    return (int(line.size()) - 3) / 2;
}

void solve() {
    int n, top_num;
    cin >> n;
    vi cnt(n);
    for (int i = 0; i < n; i++) cin >> cnt[i];

    top_num = -1;
    for (int i = 0; i < n; i++) {
        if (cnt[i]) top_num = i;
    }

    int cur_amount = 0;
    flip_and_wait();
    while (true) {
        int tmp = get_amount();
        cur_amount += tmp;
        if (top_num + 1 <= cur_amount) {
            cnt[top_num]--;
            top_num = -1;
            for (int i = 0; i < n; i++) {
                if (cnt[i]) top_num = i;
            }
            if (top_num == -1) break;
            flip_and_wait();
            cur_amount = 0;
        } else {
            wait();
        }
    }

    stop();
}

signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tests = 1;
    //  cin >> tests;
    while (tests--) {
        solve();
    }
}
```

Task C ()

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long ll;
#define vi vector<int>

void solve() {
    bool flag = false;
    string line;
    cin >> line;
    int n = line.size();
    for (int i = 0; i < n; i++) {
        if (line[i] == '?') flag = true;
    }

    if (!flag) {
        int cnt0 = 0, cnt1 = 0;
        for (int i = 0; i < n; i++) {
            if (line[i] == '0') cnt0++;
            else cnt1++;
        }

        if (n % 2 == 0 and cnt1 == cnt0) {
            for (int i = 0; i < n; i++) {
                if (line[i] == '0') line[i] = '?';
            }
            cout << line << endl;
            return;
        }

        if (n % 2 == 0 and cnt0 == n) {
            for (int i = 0; i < n / 2; i++) {
                line[i] = '?';
            }
            cout << line << endl;
            return;
        }

        if (n % 2 == 0 and cnt1 == n) {
            for (int i = 0; i < n; i++) {
                line[i] = '?';
            }
            cout << line << endl;
            return;
        }
        if (cnt1 == 0 or cnt0 == 0) {
            for (int i = 0; i < n / 2; i++) {
                line[i] = '?';
            }
            cout << line << endl;
            return;
        }
        if (cnt0 <= cnt1) {
            for (int i = 0; i < n; i++) {
                if (line[i] == '1') line[i] = '?';
            }
        } else {
            for (int i = 0; i < n; i++) {
                if (line[i] == '0') line[i] = '?';
            }
        }
    } else {
        bool has_zero = false, has_one = false;
        int cnt_q = 0, cnt_zero = 0, cnt_one = 0;
        for (int i = 0; i < n; i++) {
            if (line[i] == '1') {
                has_one = true;
                cnt_one++;
            }
            if (line[i] == '0') {
                has_zero = true;
```

```cpp
                    cnt_zero++;
                }
                if (line[i] == '?') cnt_q++;
            }

            if (cnt_q == cnt_zero) {
                for (int i = 0; i < n; i++) {
                    if (line[i] == '?') line[i] = '0';
                }
                cout << line << endl;
                return;
            }
            if (cnt_q == cnt_one) {
                for (int i = 0; i < n; i++) {
                    if (line[i] == '?') line[i] = '0';
                }
                cout << line << endl;
                return;
            }
            if (cnt_q <= n / 2) {
                if (has_zero) {
                    for (int i = 0; i < n; i++) {
                        if (line[i] == '?') line[i] = '0';
                    }
                }
                if (has_one) {
                    for (int i = 0; i < n; i++) {
                        if (line[i] == '?') line[i] = '1';
                    }
                }
                cout << line << endl;
                return;
            }
            if (has_one) {
                for (int i = 0; i < n; i++) {
                    if (line[i] == '?') line[i] = '0';
                }
            } else if (has_zero) {
                for (int i = 0; i < n; i++) {
                    if (line[i] == '?') line[i] = '1';
                }
            } else {
                for (int i = 0; i < n; i++) {
                    if (line[i] == '?') line[i] = '1';
                }
            }
        }
    }
    cout << line << endl;
}
signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tests = 1;
    cin >> tests;
    while (tests--) {
        solve();
    }
}
```

Task D ()

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long ll;
#define vi vector<int>
#define pi pair<int, int>
#define pll pair<ll, ll>
mt19937 gen(153);
const ll MOD = 998244353;

void solve() {
    ll n;
    ll res = 1;
    cin >> n;

    assert(MOD - n >= 1e8);
    for (ll i = 2; i <= n + 1; i++) {
        res = (res * i) % MOD;
    }
    cout << 0 << "_" << res << '\n';
}

signed main() {

    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tests = 1;
    //  cin >> tests;
    while (tests--) {
        solve();
    }
}
```

Task E ()

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long ll;
#define vi vector<int>

void solve() {
    int n, v, q;
    cin >> n;
    vector<ll> arr(n);
    for (int i = 0; i < n; i++) cin >> arr[i];
    cin >> q;
    while (q--) {
        int a, b;
        ll d, ans = 0;
        cin >> a >> b >> d;
        for (int i = a; i < b; i++) {
            ans += (d - 1) / arr[i] + 1;
        }
        cout << ans << '\n';
    }
}
signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tests = 1;
//   cin >> tests;
    while (tests--) {
        solve();
    }
}
```

Task F ()

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long ll;
#define vi vector<int>
#define pi pair<int, int>
#define pll pair<ll, ll>

void solve() {
    int n;
    cin >> n;
    vi dp(n, 1);
    vector<pll> arr(n);
    for (int i = 0; i < n; i++) {
        cin >> arr[i].first >> arr[i].second;
    }
    int max_ans = 1;
    for (int i = n - 1; i >= 0; i--) {
        ll cur_left = arr[i].first, cur_right = arr[i].second;
        for (int j = i + 1; j < n; j++) {
            if (cur_right >= 0 and cur_left <= 0) dp[i] = max(dp[i], dp[j] + 1);
            cur_left += arr[j].first;
            cur_right += arr[j].second;
        }
        if (cur_left <= 0 and cur_right >= 0) dp[i] = max(dp[i], 2);
        max_ans = max(max_ans, dp[i]);
    }
    cout << max_ans << '\n';
}

signed main() {
    ios::sync_with_stdio(false);
    cin.tie(nullptr);
    int tests = 1;
    //  cin >> tests;
    while (tests--) {
        solve();
    }
}
```