Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	100	31	531

Task A ()

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

#define F first
#define S second
#define all(a) a.begin(), a.end()

using namespace std;
using ll = long long;

const int N = 2e5+25;

int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    int n; cin >> n;
    vector<pair<int, int>> v(n);
    map<int, int> dp;
    for (auto &x : v) {
        cin >> x.F >> x.S;
        while (x.F%10 == 0) {
            x.S++; x.F/=10;
        }
        int k = x.F;
        for (int i = x.S; k > 0; ++i, k/=10) {
            dp[i] += k%10;
        }
    }
    int ans = dp.begin() -> F;
    while (1) {
        if (dp[ans]%10 == 0) {
            dp[ans+1] += dp[ans]/10;
            ans++;
        } else {
            break;
        }
    }
    cout << ans << "\n";
    return 228/1337;
}
```

Task B ()

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

#define F first
#define S second
#define all(a) a.begin(), a.end()

using namespace std;
using ll = long long;

const int N = 2e5+25;

int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    int n; cin >> n;
    vector<int> k(n);
    int sumk = 0;
    for (auto &x : k) cin >> x, sumk += x;
    cout << "Flip_and_wait" << endl;
    for (int i = n-1; i >= 0; --i) {
        for (int t = 0; t < k[i]; ++t) {
            int cnt = 0; sumk--;
            while (cnt < i+1) {
                string s; cin >> s;
                if (s[0] != 'B' || s == "Burn") assert(1 == 0);
                cnt += (s.size()-3)/2;
                if (cnt < i+1) cout << "Wait" << endl;
            }
            if (sumk) cout << "Flip_and_wait" << endl;
            else cout << "Stop" << endl;
        }
    }
    return 228/1337;
}
```

Task C ()

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

#define F first
#define S second
#define all(a) a.begin(), a.end()

using namespace std;
using ll = long long;

const int N = 2e5+25;

void code(string s) {
    if (s.size() == 1) cout << s;
    if (s == "11") cout << "?1";
    if (s == "01") cout << "0?";
    if (s == "00") cout << "?0";
    if (s == "10") cout << "1?";
}

void decode(string s) {
    if (s.size() == 1) cout << s;
    if (s == "?1") cout << "11";
    if (s == "0?") cout << "01";
    if (s == "?0") cout << "00";
    if (s == "1?") cout << "10";
}

int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    int n; cin >> n;
    for (int r = 0; r < n; ++r) {
        string s; cin >> s;
        int m = s.size();
        int k0 = 0, k1 = 0, kv = 0;
        for (auto c : s) {
            k0 += (c=='0');
            kv += (c=='?');
            k1 += (c=='1');
        }
        for (int i = 0; i < m; i+=2) {
            string t; t+=s[i];
            if(i+1 < m) t += s[i+1];
            if (kv) decode(t);
            else code(t);
        } cout << "\n";
    }
    return 228/1337;
}
```

Task D ()

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

#define F first
#define S second
#define all(a) a.begin(), a.end()

using namespace std;
using ll = long long;

const int N = 1e8+25;
const ll MOD = 998244353;


vector<int> precalc = {1, 295201906, 160030060, 957629942, 545208507, 213689172, 760025067,
    939830261, 506268060, 39806322,
    808258749, 440133909, 686156489, 741797144, 390377694, 12629586, 544711799, 104121967,
        495867250, 421290700, 117153405,
    57084755, 202713771, 675932866, 79781699, 956276337, 652678397, 35212756, 655645460,
        468129309, 761699708, 533047427,
    287671032, 206068022, 50865043, 144980423, 111276893, 259415897, 444094191, 593907889,
        573994984, 892454686, 566073550,
    128761001, 888483202, 251718753, 548033568, 428105027, 742756734, 546182474, 62402409,
        102052166, 826426395, 159186619,
    926316039, 176055335, 51568171, 414163604, 604947226, 681666415, 511621808, 924112080,
        265769800, 955559118, 763148293,
    472709375, 19536133, 860830935, 290471030, 851685235, 242726978, 169855231, 612759169,
        599797734, 961628039, 953297493,
    62806842, 37844313, 909741023, 689361523, 887890124, 380694152, 669317759, 367270918,
        806951470, 843736533, 377403437,
    945260111, 786127243, 80918046, 875880304, 364983542, 623250998, 598764068, 804930040,
        24257676, 214821357, 791011898,
    954947696, 183092975};


ll binpow(ll a, ll p) {
    ll r = 1;
    for ( ; p > 0; p>>=1, a=a*a%MOD) {
        if (p&1) r=r*a%MOD;
    }
    return r;
}

const int C = 1e7;


int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    ll n; cin >> n; n++;
    ll p = 1, cnt = n/MOD + n/(MOD*MOD);
    ll ans = binpow(MOD-1, n/MOD); n%=MOD;
    ll j = (n/C); ans = ans*precalc[j]%MOD;
    //cout << "! " << j << " " << cnt << " " << ans << "\n";
    for (ll i = C*j+1; i <= n; ++i) {
        ans = ans*i%MOD;
    }
    cout << cnt << "␣";
    cout << ans << "\n";
    return 228/1337;
}
```

Task E ()

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

#define F first
#define S second
#define all(a) a.begin(), a.end()

using namespace std;
using ll = long long;
using pi = pair<int, int>;

const int N = 3e5+25;
const int sz = (1<<20);

int t[2*sz];

vector<pair<int, pi>> vq[N];

void add(int i) {
    t[sz+i]++;
    for (i = (i+sz)>>1; i > 0; i>>=1)
        t[i] = t[i*2]+t[i*2+1];
}

ll get(int j) {
    ll sum = 0; j+=sz;
    for (int i = sz; i <= j; i>>=1, j>>=1) {
        if (i&1) sum += t[i++];
        if (!(j&1)) sum += t[j--];
    }
    return sum;
}

int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    int n; cin >> n;
    vector<int> v(n); for (auto &x : v) cin >> x;
    int q; cin >> q;
    vector<ll> ans(q);
    for (int t = 0; t < q; ++t) {
        int a, b, d; cin >> a >> b >> d;
        if (a) vq[a-1].push_back({-1, {d, t}});
        vq[b-1].push_back({1, {d, t}});
    }
    int D = 1000;
    vector<int> dmin(D+1);
    for (int i = 0; i < n; ++i) {
        if (v[i] < D)  {
            dmin[v[i]]++;
        } else {
            for (int k = 1; k <= D; ++k) {
                int pos = v[i]*(k-1)+1;
                if (pos > 1e6) break;
                add(pos);
            }
        }
        for (auto tmp : vq[i]) {
            int type = tmp.F, d = tmp.S.F, id = tmp.S.S;
            ll sum = get(d);
            for (int x = 1; x <= D; ++x) sum += (ll)((d+x-1)/x)*dmin[x];
            ans[id] += (ll)type*sum;
        }
    }
    for (auto x : ans) cout << x << "\n";
    return 228/1337;
}
```

Task F ()

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

#define F first
#define S second
#define all(a) a.begin(), a.end()

using namespace std;
using ll = long long;

const int N = 1e4+7;


int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    int n; cin >> n;
    vector<int> l(n+1), r(n+1);
    for (int i = 1; i <= n; ++i) cin >> l[i] >> r[i];
    int ans = 1;
    vector<int> dp(n+1); dp[0] = 1;
    for (int i = 1; i <= n; ++i) {
        ll suml = 0, sumr = 0;
        dp[i] = 1;
        for (int j = i-1; j >= 0; --j) {
            suml += l[j+1]; sumr += r[j+1];
            if (suml <= 0 && sumr >= 0) {
                dp[i] = max(dp[i], dp[j]+1);
            }
        }
        ans = max(ans, dp[i]);
    }

    cout << ans << "\n";
    return 228/1337;
}
```