

Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	58	0	458

Task A ()

```
#include <iostream>
#include <iomanip>
#include <vector>
#include <algorithm>
#include <string>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <queue>
#include <stack>
#include <random>
#include <cassert>
#define ll long long
#define ull unsigned long long
#define ld long double
#define uint unsigned int
#define fi first
#define se second
#define pii pair<int,int>
#define all(x) x.begin(), x.end()
// #pragma GCC optimize("Ofast")
// #pragma GCC target("avx2")
// #pragma comment(linker, "/stack:200000000")
using namespace std;
const int inf = 2e9 + 100;
const ll mod1 = 998244353;
const ll mod2 = 1e9 + 531;
const ll p1 = 227;
const ll p2 = 233;
const ll obrP = 386984595;
const ll obrP2 = 94420651;
const ll infll = 1e18;
const ld pi = 3.141592653589;
const int N = 500010;
vector<int> a, b;
vector<pii> p;
int n;
int len (ll big) {
    int res = 0;
    while (big > 0) {
        big /= 10;
        ++res;
    }
    return res;
};
ll pow10 (int x) {
    ll res = 1;
    for (int _ = 0; _ < x; ++_) {
        res *= 10;
    }
    return res;
};
int upd (ll &big, int max) {
    int res = 0;
    while (res < max && big % 10 == 0) {
```

```

        big /= 10;
        ++res;
    }
    return res;
};
int solve () {
    sort(p.begin(), p.begin() + n, [&] (pii x, pii y) {
        if (y.se != x.se) {
            return x.se < y.se;
        }
        return x.fi < y.fi;
    });
    int i = 1;
    ll ts = p[0].fi;
    while (i < n && p[i].se == p[i - 1].se) {
        ts += p[i].fi;
        ++i;
    }
    int ans = p[0].se;
    if (i < n) {
        ans += upd(ts, p[i].se - ans);
    }
    while (i < n && (p[i].se == ans)) {
        ts += p[i].fi;
        ++i;
        if (i < n) {
            ans += upd(ts, p[i].se - ans);
        }
    }
    return ans + upd(ts, 1000);
}

int solve2 () {
    ll ans = 0;
    for (int i = 0; i < n; ++i) {
        ans += a[i] * pow10(b[i]);
    }
    return upd(ans, 1000);
}

int main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0); cout.tie(0);
    a.resize(200500), b.resize(200500), p.resize(200500);
    cin >> n;
    for (int i = 0; i < n; ++i) {
        cin >> a[i] >> b[i];
        p[i] = {a[i], b[i]};
    }
    cout << solve();
    /*mt19937 gen(43);
    while (true) {
        n = gen() % 5 + 1;
        for (int i = 0; i < n; ++i) {
            b[i] = gen() % 3;
            a[i] = gen() % 1000 + 1;
            p[i] = {a[i], b[i]};
        }
        if (solve() != solve2()) {
            cout << solve() << ' ' << solve2() << '\n';
            cout << n << '\n';
            for (int i = 0; i < n; ++i) {
                cout << a[i] << ' ' << b[i] << '\n';
            }
            break;
        }
    }
    */
}

```

Task B ()

```
#include <iostream>
#include <iomanip>
#include <vector>
#include <algorithm>
#include <string>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <queue>
#include <stack>
#include <random>
#include <cassert>
#define ll long long
#define ull unsigned long long
#define ld long double
#define uint unsigned int
#define fi first
#define se second
#define pii pair<int,int>
#define all(x) x.begin(), x.end()
//#pragma GCC optimize("Ofast")
//#pragma GCC target("avx2")
//#pragma comment(linker, "/stack:200000000")
using namespace std;
const int inf = 2e9 + 100;
const ll mod1 = 998244353;
const ll mod2 = 1e9 + 531;
const ll p1 = 227;
const ll p2 = 233;
const ll obrP = 386984595;
const ll obrP2 = 94420651;
const ll infl1 = 1e18;
const ld pi = 3.141592653589;
const int N = 500010;

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

void solve () {
    int n; cin >> n;
    int ns = n;
    string s;
    vector<int> k(n), t(n, -1);
    vector<vector<int>> c(n + 1);
    for (int i = 0; i < n; ++i) {
        cin >> k[i];
    }
    for (int i = n - 1; i >= 0; --i) {
        if (k[i] == 0) {
            continue;
        }
        n = i + 1;
        break;
    }
    cout << "Flip_and_wait" << endl;
    int tmp = 0;
    int time = 0;
    int first = 0;
    while (tmp < n) {
        cin >> s;
        tmp += get(s);
        ++time;
        for (int i = first; i < first + get(s); ++i) {
            t[i] = time;
            c[time].push_back(i);
        }
        first += get(s);
        if (tmp < n)
            cout << "Wait" << endl;
    }
}
```

```

k[n - 1]--;
for (int i = n - 1; i >= 0; --i) {
    for (int j = 0; j < k[i]; ++j) {
        cout << "Flip_and_wait" << endl;
        cin >> s;
        int tmp = 0;
        while (tmp < t[i]) {
            tmp++;
            if (tmp < t[i]) {
                cout << "Wait" << endl;
                cin >> s;
            }
        }
    }
}
cout << "Stop" << endl;
}

int main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0); cout.tie(0);
    solve();
}

```

Task C ()

```
#include <iostream>
#include <iomanip>
#include <vector>
#include <algorithm>
#include <string>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <queue>
#include <stack>
#include <random>
#include <cassert>
#define ll long long
#define ull unsigned long long
#define ld long double
#define uint unsigned int
#define fi first
#define se second
#define pii pair<int,int>
#define all(x) x.begin(), x.end()
// #pragma GCC optimize("Ofast")
// #pragma GCC target("avx2")
// #pragma comment(linker, "/stack:200000000")
using namespace std;
const int inf = 2e9 + 100;
const ll mod1 = 998244353;
const ll mod2 = 1e9 + 531;
const ll p1 = 227;
const ll p2 = 233;
const ll obrP = 386984595;
const ll obrP2 = 94420651;
const ll infll = 1e18;
const ld pi = 3.141592653589;
const int N = 500010;

void solve () {
    map<string,string> m1, m2;
    m1["00"] = "?0"; m2["?0"] = "00";
    m1["01"] = "0?"; m2["0?"] = "01";
    m1["10"] = "1?"; m2["1?"] = "10";
    m1["11"] = "?1"; m2["?1"] = "11";
    string s; cin >> s;
    int n = s.size();
    bool flag = false;
    for (int i = 0; i < n; ++i) {
        if (s[i] == '?') {
            flag = true;
            break;
        }
    }
    for (int i = 0; (i + 1) < n; i += 2) {
        if (flag) {
            cout << m2[s.substr(i, 2)];
        } else {
            cout << m1[s.substr(i, 2)];
        }
    }
    if (n % 2 != 0) {
        cout << s[n - 1];
    }
    cout << '\n';
}

int main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0); cout.tie(0);
    int q; cin >> q; while (q--)
        solve();
}
```

Task D ()

```

#include <iostream>
#include <iomanip>
#include <vector>
#include <algorithm>
#include <string>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <queue>
#include <stack>
#include <random>
#include <cassert>
#define ll long long
#define ull unsigned long long
#define ld long double
#define uint unsigned int
#define fi first
#define se second
#define pii pair<int,int>
#define all(x) x.begin(), x.end()
// #pragma GCC optimize("Ofast")
// #pragma GCC target("avx2")
// #pragma comment(linker, "/stack:200000000")
using namespace std;
const int inf = 2e9 + 100;
const ll mod1 = 998244353;
const ll mod2 = 1e9 + 531;
const ll p1 = 227;
const ll p2 = 233;
const ll obrP = 386984595;
const ll obrP2 = 94420651;
const ll infl1 = 1e18;
const ld pi = 3.141592653589;
const int N = 500010;
ll mod = 998244353;
ll tmp = 998244352;
ll octo = 100000000;
/*vector<ll> mem = {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};*/

vector<ll> mem = {1, 808258749, 117153405, 761699708, 573994984, 62402409, 511621808, 242726978,
    887890124, 875880304};

void precalc () {
    ll res = 1;
    for (ll i = 1; i <= mod; ++i) {
        res = res * i % mod;
        if (i % octo == 0) {
            cout << res << ",_";
        }
    }
}

ll binPow (ll a, ll b) {
    if (b == 0)
        return 1;

```

```

a = a % mod;
if (b % 2 == 0) {
    return binPow(a * a % mod, b / 2);
}
return a * binPow(a, b - 1) % mod;
}

void solve () {
    ll n; cin >> n;
    ++n;
    ll res = 1;
    ll k = n / mod;
    cout << k + n / (mod * mod) << '␣';
    ll ns = k * mod;
    ll m = n % mod;
    res = binPow(tmp, k);
    res = res * mem[m / octo] % mod;
    for (ll i = (m / octo) * octo + 1; i <= m; ++i) {
        res = res * i % mod;
    }
    cout << (res % mod + mod) % mod;
}

int main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0); cout.tie(0);
    //int q; cin >> q; while (q--)
    solve();
}

```

Task E ()

```
#include <iostream>
#include <iomanip>
#include <vector>
#include <algorithm>
#include <string>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <queue>
#include <stack>
#include <random>
#include <cassert>
#define ll long long
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#define ld long double
#define uint unsigned int
#define fi first
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#define pii pair<int,int>
#define all(x) x.begin(), x.end()
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//#pragma GCC target("avx2")
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using namespace std;
const int inf = 2e9 + 100;
const ll mod1 = 998244353;
const ll mod2 = 1e9 + 531;
const ll p1 = 227;
const ll p2 = 233;
const ll obrP = 386984595;
const ll obrP2 = 94420651;
const ll infl1 = 1e18;
const ld pi = 3.141592653589;
const int N = 500010;

void solve () {
    int n; cin >> n;
    vector<ll> v(n);
    for (int i = 0; i < n; ++i) {
        cin >> v[i];
    }
    int q; cin >> q;
    for (int _ = 0; _ < q; ++_) {
        ll a, b, d; cin >> a >> b >> d;
        --a, --b;
        ll ans = 0;
        for (int i = a + 1; i <= b; ++i) {
            ans += (d + v[i] - 1) / v[i];
        }
        cout << ans << '\n';
    }
}

int main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0); cout.tie(0);
    //int q; cin >> q; while (q--)
    solve();
}
```


Task F ()