

Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	58	31	489

Task A ()

```
#include <bits/stdc++.h>
// #pragma GCC optimize("Ofast")
// #pragma GCC target("sse,sse2,sse3,sse4")
// #pragma GCC optimize("unroll-loops")
#define ff first
#define ss second
#define pb push_back
#define mp make_pair
#define umap unordered_map
#define uset unordered_set
// #define LONG

typedef long long ll;
typedef long double ld;

using namespace std;

const int inf9 = 1e9 + 10;
const ll inf18 = 1e18 + 10;
const int M = 1e9 + 7;

#ifdef LONG
#define int ll
#define inf inf18
#else
#define inf inf9
#endif

template <typename T> void print(T a){for (auto x : a){cout << x << " ";}cout << endl;}
template <typename T> istream& operator>>(istream& is, vector<T>& a){for (int i = 0; i < a.size(); i++){is >> a[i];}return is;}
template <typename T> ostream& operator<<(ostream& os, vector<T>& a){for (int i = 0; i < a.size(); i++){os << a[i] << " ";}os << endl;return os;}
template <typename T1, typename T2> istream& operator>>(istream& is, pair<T1, T2>& a){is >> a.ff >> a.ss;return is;}
template <typename T1, typename T2> ostream& operator<<(ostream& os, pair<T1, T2> a){os << "(" << a.ff << ", " << a.ss << " ";return os;}

map<int, int> c;

void pl(int x, int k){
    c[k] += x;
    if (c[k] >= 10){
        c[k] -= 10;
        pl(1, k + 1);
        if (c[k] == 0){
            c.erase(k);
        }
    }
}

void solve(){
    int n;
    cin >> n;
    for (int i = 0; i < n; i++){
        int a, b;
```

```

        cin >> a >> b;
        while (a > 0){
            if (a % 10 > 0){
                pl(a % 10, b);
            }
            a /= 10;
            b++;
        }
    }
    cout << (*c.begin()).ff << endl;
}

int32_t main(){
#ifdef LOCAL
    //freopen("input.txt", "r", stdin);freopen("output.txt", "w", stdout);
    ios_base::sync_with_stdio(false);cin.tie(0);cout.tie(0);
#endif
    int ttt = 1;
    //cin >> ttt;
    while (ttt--){
        solve();
    }
}

```

Task B ()

```
#include <bits/stdc++.h>
// #pragma GCC optimize("Ofast")
// #pragma GCC target("sse,sse2,sse3,sse4")
// #pragma GCC optimize("unroll-loops")
#define ff first
#define ss second
#define pb push_back
#define mp make_pair
#define umap unordered_map
#define uset unordered_set
// #define LONG

typedef long long ll;
typedef long double ld;

using namespace std;

const int inf9 = 1e9 + 10;
const ll inf18 = 1e18 + 10;
const int M = 1e9 + 7;

#ifdef LONG
#define int ll
#define inf inf18
#else
#define inf inf9
#endif

template <typename T> void print(T a){for (auto x : a){cout << x << " ";}cout << endl;}
template <typename T> istream& operator>>(istream& is, vector<T>& a){for (int i = 0; i < a.size(); i++){is >> a[i];}return is;}
template <typename T> ostream& operator<<(ostream& os, vector<T>& a){for (int i = 0; i < a.size(); i++){os << a[i] << " ";}os << endl;return os;}
template <typename T1, typename T2> istream& operator>>(istream& is, pair<T1, T2>& a){is >> a.ff >> a.ss;return is;}
template <typename T1, typename T2> ostream& operator<<(ostream& os, pair<T1, T2> a){os << "(" << a.ff << ", " << a.ss << " ";return os;}

int act(int t){
    if (t == 1){
        cout << "Wait" << endl;
    }
    else if (t == 2){
        cout << "Flip_and_wait" << endl;
    }
    else {
        cout << "Stop" << endl;
        exit(0);
    }
}

string s;
cin >> s;
assert(s != "Burn");
assert(s != "Tired");
assert(s != "Fail");
int c = 0;
for (auto ch : s){
    c += (ch == 'e');
}
return c / 2;
}

void solve(){
    int n;
    cin >> n;
    vector<int> k(n);
    cin >> k;
    for (int i = 0; i < n; i++){
        for (int j = 0; j < k[i] / 2; j++){
            int c = act(2);
            while (c < i + 1){
                c += act(1);
            }
        }
    }
}
```

```

        c = act(2);
        while (c < n){
            c += act(1);
        }
    }
    k[i] %= 2;
}
for (int i = n - 1; i >= 0; i--){
    if (k[i]){
        int c = act(2);
        while (c < i + 1){
            c += act(1);
        }
    }
}
act(3);
}

int32_t main(){
    int ttt = 1;
    //cin >> ttt;
    while (ttt--){
        solve();
    }
}

```

Task C ()

```
#include <bits/stdc++.h>
// #pragma GCC optimize("Ofast")
// #pragma GCC target("sse,sse2,sse3,sse4")
// #pragma GCC optimize("unroll-loops")
#define ff first
#define ss second
#define pb push_back
#define mp make_pair
#define umap unordered_map
#define uset unordered_set
// #define LONG

typedef long long ll;
typedef long double ld;

using namespace std;

const int inf9 = 1e9 + 10;
const ll inf18 = 1e18 + 10;
const int M = 1e9 + 7;

#ifdef LONG
#define int ll
#define inf inf18
#else
#define inf inf9
#endif

template <typename T> void print(T a){for (auto x : a){cout << x << " ";}cout << endl;}
template <typename T> istream& operator>>(istream& is, vector<T>& a){for (int i = 0; i < a.size(); i++){is >> a[i];}return is;}
template <typename T> ostream& operator<<(ostream& os, vector<T>& a){for (int i = 0; i < a.size(); i++){os << a[i] << " ";}os << endl;return os;}
template <typename T1, typename T2> istream& operator>>(istream& is, pair<T1, T2>& a){is >> a.ff >> a.ss;return is;}
template <typename T1, typename T2> ostream& operator<<(ostream& os, pair<T1, T2> a){os << "(" << a.ff << ", " << a.ss << " ";return os;}

void decode(const string &s){
    int c0 = 0, c1 = 0, c2 = 0, n = (int)s.size();
    if (n == 1){
        cout << s << endl;
        return;
    }
    for (auto ch : s){
        c0 += (ch == '0');
        c1 += (ch == '1');
        c2 += (ch == '?');
    }
    if (c2 == n / 2 && c1 == 0){
        for (int i = 0; i < n; i++){
            cout << '0';
        }
        cout << endl;
        return;
    }
    char c = '1';
    if (c0 < c1){
        c = '0';
    }
    for (auto ch : s){
        cout << (ch == '?' ? c : ch);
    }
    cout << endl;
}

void encode(const string &s){
    int c1 = 0, c0 = 0, n = (int)s.size();
    if (n == 1){
        cout << s << endl;
        return;
    }
}
```

```

    for (auto c : s){
        c1 += (c == '1');
        c0 += (c == '0');
    }
    if (c0 == n){
        for (int i = 0; i < n / 2; i++){
            cout << '?';
        }
        for (int i = 0; i < n - n / 2; i++){
            cout << '0';
        }
        cout << endl;
        return;
    }
    char c = '0';
    if (c1 > c0){
        c = '1';
    }
    for (auto ch : s){
        cout << (ch == c ? '?' : ch);
    }
    cout << endl;
};

void solve(){
    string s;
    cin >> s;
    int fl = 0;
    for (auto c : s){
        if (c == '?'){
            decode(s);
            fl = 1;
            break;
        }
    }
    if (!fl){
        encode(s);
    }
}

int32_t main(){
#ifdef LOCAL
    //freopen("input.txt", "r", stdin);freopen("output.txt", "w", stdout);
    ios_base::sync_with_stdio(false);cin.tie(0);cout.tie(0);
#endif
    int ttt = 1;
    cin >> ttt;
    while (ttt--){
        solve();
    }
}

```

Task D ()

```
#include <bits/stdc++.h>
// #pragma GCC optimize("Ofast")
// #pragma GCC target("sse,sse2,sse3,sse4")
// #pragma GCC optimize("unroll-loops")
#define ff first
#define ss second
#define pb push_back
#define mp make_pair
#define umap unordered_map
#define uset unordered_set
#define LONG

typedef long long ll;
typedef long double ld;

using namespace std;

const int inf9 = 1e9 + 10;
const ll inf18 = 1e18 + 10;

#ifdef LONG
#define int ll
#define inf inf18
#else
#define inf inf9
#endif

const int M = 998244353;

template <typename T> void print(T a){for (auto x : a){cout << x << " ";}cout << endl;}
template <typename T> istream& operator>>(istream& is, vector <T>& a){for (int i = 0; i < a.size(); i++){is >> a[i];}return is;}
template <typename T> ostream& operator<<(ostream& os, vector <T>& a){for (int i = 0; i < a.size(); i++){os << a[i] << " ";}os << endl;return os;}
template <typename T1, typename T2> istream& operator>>(istream& is, pair <T1, T2>& a){is >> a.ff >> a.ss;return is;}
template <typename T1, typename T2> ostream& operator<<(ostream& os, pair <T1, T2> a){os << a.ff << " " << a.ss;return os;}

vector <int> p = {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};

int fact(int n){
    int f = p[n / 10000000];
    for (int i = (n / 10000000) * 10000000 + 1; i <= n; i++){
        f = (f * i) % M;
    }
    return f;
}

int factmod(int n){
    int res = 1;
    while(n > 1){
        res = res * ((n / M) % 2 ? M - 1 : 1) % M;
        res = res * fact(n % M) % M;
        n /= M;
    }
}
```

```

    }
    return res;
}

void solve(){
    int n;
    cin >> n;
    n++;
    cout << n / M + n / M / M << "␣" << factmod(n) << endl;
}

int32_t main(){
#ifdef LOCAL
    //freopen("input.txt", "r", stdin);freopen("output.txt", "w", stdout);
    ios_base::sync_with_stdio(false);cin.tie(0);cout.tie(0);
#endif
    int ttt = 1;
    //cin >> ttt;
    while (ttt--){
        solve();
    }
}

```


Task E ()

```
#include <bits/stdc++.h>
// #pragma GCC optimize("Ofast")
// #pragma GCC target("sse,sse2,sse3,sse4")
// #pragma GCC optimize("unroll-loops")
#define ff first
#define ss second
#define pb push_back
#define mp make_pair
#define umap unordered_map
#define uset unordered_set
// #define LONG

typedef long long ll;
typedef long double ld;

using namespace std;

const int inf9 = 1e9 + 10;
const ll inf18 = 1e18 + 10;
const int M = 1e9 + 7;

#ifdef LONG
#define int ll
#define inf inf18
#else
#define inf inf9
#endif

template <typename T> void print(T a){for (auto x : a){cout << x << " ";}cout << endl;}
template <typename T> istream& operator>>(istream& is, vector<T>& a){for (int i = 0; i < a.size(); i++){is >> a[i];}return is;}
template <typename T> ostream& operator<<(ostream& os, vector<T>& a){for (int i = 0; i < a.size(); i++){os << a[i] << " ";}os << endl;return os;}
template <typename T1, typename T2> istream& operator>>(istream& is, pair<T1, T2>& a){is >> a.ff >> a.ss;return is;}
template <typename T1, typename T2> ostream& operator<<(ostream& os, pair<T1, T2> a){os << "(" << a.ff << ", " << a.ss << " ";return os;}

void solve(){
    int n;
    cin >> n;
    vector<int> v(n);
    cin >> v;
    int q;
    cin >> q;
    while (q--){
        int l, r, x;
        cin >> l >> r >> x;
        ll c = 0;
        for (int i = l; i < r; i++){
            c += (x - 1) / v[i] + 1;
        }
        cout << c << endl;
    }
}

int32_t main(){
#ifdef LOCAL
    // freopen("input.txt", "r", stdin);freopen("output.txt", "w", stdout);
    ios_base::sync_with_stdio(false);cin.tie(0);cout.tie(0);
#endif
    int ttt = 1;
    // cin >> ttt;
    while (ttt--){
        solve();
    }
}
```

Task F ()

```
#include <bits/stdc++.h>
// #pragma GCC optimize("Ofast")
// #pragma GCC target("sse,sse2,sse3,sse4")
// #pragma GCC optimize("unroll-loops")
#define ff first
#define ss second
#define pb push_back
#define mp make_pair
#define umap unordered_map
#define uset unordered_set
#define LONG

typedef long long ll;
typedef long double ld;

using namespace std;

const int inf9 = 1e9 + 10;
const ll inf18 = 1e18 + 10;
const int M = 1e9 + 7;

#ifdef LONG
#define int ll
#define inf inf18
#else
#define inf inf9
#endif

template <typename T> void print(T a){for (auto x : a){cout << x << " ";}cout << endl;}
template <typename T> istream& operator>>(istream& is, vector<T>& a){for (int i = 0; i < a.size(); i++){is >> a[i];}return is;}
template <typename T> ostream& operator<<(ostream& os, vector<T>& a){for (int i = 0; i < a.size(); i++){os << a[i] << " ";}os << endl;return os;}
template <typename T1, typename T2> istream& operator>>(istream& is, pair<T1, T2>& a){is >> a.ff >> a.ss;return is;}
template <typename T1, typename T2> ostream& operator<<(ostream& os, pair<T1, T2> a){os << "(" << a.ff << ", " << a.ss << " ";return os;}

void solve(){
    int n;
    cin >> n;
    vector<int> pl(n + 1), pr(n + 1);
    for (int i = 0; i < n; i++){
        int l, r;
        cin >> l >> r;
        pl[i + 1] = pl[i] + l;
        pr[i + 1] = pr[i] + r;
    }
    vector<int> dp(n + 1, 1);
    for (int i = 1; i <= n; i++){
        for (int j = 0; j < i; j++){
            int l = pl[i] - pl[j], r = pr[i] - pr[j];
            if (l <= 0 && 0 <= r){
                dp[i] = max(dp[i], dp[j] + 1);
            }
        }
    }
    int mx = 1;
    for (int i = 0; i <= n; i++){
        mx = max(mx, dp[i]);
    }
    cout << mx << endl;
}

int32_t main(){
#ifdef LOCAL
    // freopen("input.txt", "r", stdin);freopen("output.txt", "w", stdout);
    ios_base::sync_with_stdio(false);cin.tie(0);cout.tie(0);
#endif
    int ttt = 1;
    // cin >> ttt;
    while (ttt--){
```

```
    solve();  
}
```