

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>
// #include <ext/pb_ds/assoc_container.hpp>
// #include <ext/pb_ds/tree_policy.hpp>

using namespace std;
// using namespace __gnu_pbds;

// #pragma GCC optimize("O3,unroll-loops")
// #pragma GCC target("sse,sse2,ssse3,sse4.1,sse4.2,avx,avx2")

typedef long long ll;
typedef long double ld;

// template<typename T>
// using ordered_set = tree<T, null_type, less<T>, rb_tree_tag, tree_order_statistics_node_update>;

#define all(x) begin(x), end(x)
#define rall(x) rbegin(x), rend(x)
#define ff first
#define ss second
#define _ << " " <<

// #define LOCAL

#ifdef LOCAL
#define err cerr
#else
#define err if (0) cerr
#endif // LOCAL

mt19937 rnd(time(0));

#define int ll

void solve() {
    int n;
    cin >> n;

    int a, b;
    map<int, int> sm;
    int mn = 1e10;
    for (int i = 0; i < n; ++i) {
        cin >> a >> b;
        while (a % 10 == 0) {
            a /= 10;
            b++;
        }

        if (b < mn) {
            mn = b;
        }
        sm[b] += a;
        while (sm[mn] > 0 && sm[mn] % 10 == 0) {
            sm[mn + 1] += sm[mn] / 10;
            sm[mn] = 0;
            mn++;
        }
    }
}
```

```

    }
}

cout << mn << endl;
}

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(nullptr);
    cout.tie(nullptr);
#ifdef LOCAL
    freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#else
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#endif // LOCAL
    int tests = 1;
    //    cin >> tests;
    while (tests--) {
        solve();
        cout << "\n";
    }

    err << endl;
    err << "WorkTime" _ (1d)clock() / (1d)CLOCKS_PER_SEC << endl;
}

```

Task B ()

```
#include <bits/stdc++.h>
// #include <ext/pb_ds/assoc_container.hpp>
// #include <ext/pb_ds/tree_policy.hpp>

using namespace std;
// using namespace __gnu_pbds;

// #pragma GCC optimize("O3,unroll-loops")
// #pragma GCC target("sse,sse2,ssse3,sse4.1,sse4.2,avx,avx2")

typedef long long ll;
typedef long double ld;

// template<typename T>
// using ordered_set = tree<T, null_type, less<T>, rb_tree_tag, tree_order_statistics_node_update>;

#define all(x) begin(x), end(x)
#define rall(x) rbegin(x), rend(x)
#define ff first
#define ss second
#define _ << " " <<

// #define LOCAL

#ifdef LOCAL
#define err cerr
#else
#define err if (0) cerr
#endif // LOCAL

mt19937 rnd(time(0));

#define int ll

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

void solve() {
    int n;
    cin >> n;

    vector<int> k(n);
    for (int i = 0; i < n; ++i) {
        cin >> k[i];
    }

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

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(nullptr);
    cout.tie(nullptr);
#ifdef LOCAL
    // freopen("input.txt", "r", stdin);
    // freopen("output.txt", "w", stdout);
#endif
}
```

```

#else
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#endif // LOCAL
    int tests = 1;
    //    cin >> tests;
    while (tests--) {
        solve();
        cout << "\n";
    }

    err << endl;
    err << "WorkTime" _ (1d)clock() / (1d)CLOCKS_PER_SEC << endl;
}

```

Task C ()

```
#include <bits/stdc++.h>
// #include <ext/pb_ds/assoc_container.hpp>
// #include <ext/pb_ds/tree_policy.hpp>

using namespace std;
// using namespace __gnu_pbds;

// #pragma GCC optimize("O3,unroll-loops")
// #pragma GCC target("sse,sse2,ssse3,sse4.1,sse4.2,avx,avx2")

typedef long long ll;
typedef long double ld;

// template<typename T>
// using ordered_set = tree<T, null_type, less<T>, rb_tree_tag, tree_order_statistics_node_update>;

#define all(x) begin(x), end(x)
#define rall(x) rbegin(x), rend(x)
#define ff first
#define ss second
#define _ << " _ " <<

// #define LOCAL

#ifdef LOCAL
#define err cerr
#else
#define err if (0) cerr
#endif // LOCAL

mt19937 rnd(time(0));

#define int ll

void solve() {
    int t;
    cin >> t;

    string s;
    while (t--) {
        cin >> s;
        int n = s.length();

        int cnt = 0;
        bool fl = 0;
        for (auto c : s) {
            if (c == '?') {
                cnt++;
                fl = 1;
            }
        }

        if (fl && cnt < n / 2) {
            cout << s _ -1 << endl;
        }

        if (fl) {
            if (cnt == n - 1 && s[0] != '?') {
                char c;
                if (s[0] == '1') c = '0';
                if (s[0] == '0') c = '1';
                for (int i = 0; i < n / 2; ++i) {
                    cout << s[i];
                }
                for (int i = n / 2; i < n; ++i) {
                    cout << c;
                }
                cout << "\n";
                continue;
            }

            char c1 = 0;
```

```

char c2 = 0;
bool fl1 = 0;
for (int i = 0; i < n / 2; ++i) {
    if (s[i] != '?') {
        if (c1 != 0 && c1 != s[i]) {
            fl1 = 1;
            for (int j = 0; j < n / 2; ++j) {
                cout << s[j];
            }
            for (int j = n / 2; j < n; ++j) {
                cout << s[j];
            }
            cout << "\n";
            break;
        }
        c1 = s[i];
    }
}
if (fl1) continue;

if (c1 == '1') c2 = '0';
if (c1 == '0') c2 = '1';
if (c1 == 0) {
    for (int i = n / 2; i < n; ++i)
        if (s[i] != '?') c2 = s[i];
}
if (c2 == '1') c1 = '0';
if (c2 == '0') c1 = '1';
swap(c1, c2);
for (int i = 0; i < n / 2; ++i) {
    if (s[i] == '?') cout << c1;
    else cout << s[i];
}
for (int i = n / 2; i < n; ++i) {
    if (s[i] == '?') cout << c2;
    else cout << s[i];
}
cout << "\n";
} else {
    int c1 = 0;
    int c2 = 0;
    for (int i = 0; i < n / 2; ++i) {
        if (s[i] == '1') c1++;
    }
    for (int i = n / 2; i < n; ++i) {
        if (s[i] == '1') c2++;
    }

    int sz1 = n / 2;
    int sz2 = n - n / 2;
    if (c1 == sz1 && c2 == 0) {
        cout << s[0];
        for (int i = 1; i < n / 2; ++i) {
            cout << '?';
        }
        for (int i = n / 2; i < n; ++i) {
            cout << '?';
        }
        cout << "\n";
        continue;
    }
    if (c1 == 0 && c2 == sz2) {
        cout << s[0];
        for (int i = 1; i < n / 2; ++i) {
            cout << '?';
        }
        for (int i = n / 2; i < n; ++i) {
            cout << '?';
        }
        cout << "\n";
        continue;
    }

    if (c1 + sz2 - c2 >= n / 2 && !(c1 + sz2 - c2 == n - 1 && s[0] == '0')) {

```

```

        for (int i = 0; i < n / 2; ++i) {
            if (s[i] == '1') cout << "?";
            else cout << s[i];
        }
        for (int i = n / 2; i < n; ++i) {
            if (s[i] == '0') cout << '?';
            else cout << s[i];
        }
        cout << "\n";
        continue;
    }
    if (sz1 - c1 + c2 >= n / 2 && !(sz1 - c1 + c2 == n - 1 && s[0] == '1')) {
        for (int i = 0; i < n / 2; ++i) {
            if (s[i] == '0') cout << "?";
            else cout << s[i];
        }
        for (int i = n / 2; i < n; ++i) {
            if (s[i] == '1') cout << '?';
            else cout << s[i];
        }
        cout << "\n";
        continue;
    }

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

}

}

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(nullptr);
    cout.tie(nullptr);
#ifdef LOCAL
    freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#else
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#endif // LOCAL
    int tests = 1;
    //    cin >> tests;
    while (tests--) {
        solve();
        cout << "\n";
    }

    err << endl;
    err << "WorkTime" _ (1d)clock() / (1d)CLOCKS_PER_SEC << endl;
}

```

Task D ()

```
#include <bits/stdc++.h>
// #include <ext/pb_ds/assoc_container.hpp>
// #include <ext/pb_ds/tree_policy.hpp>

using namespace std;
// using namespace __gnu_pbds;

// #pragma GCC optimize("O3,unroll-loops")
// #pragma GCC target("sse,sse2,ssse3,sse4.1,sse4.2,avx,avx2")

typedef long long ll;
typedef long double ld;

// template<typename T>
// using ordered_set = tree<T, null_type, less<T>, rb_tree_tag, tree_order_statistics_node_update>;

#define all(x) begin(x), end(x)
#define rall(x) rbegin(x), rend(x)
#define ff first
#define ss second
#define _ << " _ " <<

// #define LOCAL

#ifdef LOCAL
#define err cerr
#else
#define err if (0) cerr
#endif // LOCAL

mt19937 rnd(time(0));

#define int ll

const int C = 998244353;
const int C1 = 808258749;
const int C2 = 117153405;
const int C3 = 761699708;
const int C4 = 573994984;
const int C5 = 62402409;
const int C6 = 511621808;
const int C7 = 242726978;
const int C8 = 887890124;
const int C9 = 875880304;
const int K = 998244352;

void print(int x) {
    while (x > 0) {
        err << x % 2;
        x /= 2;
    }
    err << endl;
}

int pw(int x, int y) {
    if (y == 0) return 1;
    if (y % 2 == 1) return pw(x, y - 1) * x % C;
    return pw(x * x % C, y / 2) % C;
}

void solve() {
    int n;
    cin >> n;
    ++n;

    int ans = 1;
    int c = n / C;
    ans = pw(K, c);
    n %= C;

    int x = 9e8;
    if (n >= x) {
```



```

    ans *= C9;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;
        ans %= C;
    }
    n = 0;
}
x = 8e8;
if (n >= x) {
    ans *= C8;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;
        ans %= C;
    }
    n = 0;
}
x = 7e8;
if (n >= x) {
    ans *= C7;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;
        ans %= C;
    }
    n = 0;
}
x = 6e8;
if (n >= x) {
    ans *= C6;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;
        ans %= C;
    }
    n = 0;
}
x = 5e8;
if (n >= x) {
    ans *= C5;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;
        ans %= C;
    }
    n = 0;
}
x = 4e8;
if (n >= x) {
    ans *= C4;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;
        ans %= C;
    }
    n = 0;
}
x = 3e8;
if (n >= x) {
    ans *= C3;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;
        ans %= C;
    }
    n = 0;
}
x = 2e8;
if (n >= x) {
    ans *= C2;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;

```

```

        ans %= C;
    }
    n = 0;
}
x = 1e8;
if (n >= x) {
    ans *= C1;
    ans %= C;
    for (int i = x + 1; i <= n; ++i) {
        ans *= i;
        ans %= C;
    }
    n = 0;
}
for (int i = 1; i <= n; ++i) {
    ans *= i;
    ans %= C;
}

cout << c _ ans;
}

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(nullptr);
    cout.tie(nullptr);
#ifdef LOCAL
    freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#else
    //freopen("input.txt", "r", stdin);
    //freopen("output.txt", "w", stdout);
#endif // LOCAL
    solve();

    err << endl;
    err << "WorkTime" _ (1d)clock() / (1d)CLOCKS_PER_SEC << endl;
}

```

Task E ()

```
#include <bits/stdc++.h>
// #include <ext/pb_ds/assoc_container.hpp>
// #include <ext/pb_ds/tree_policy.hpp>

using namespace std;
// using namespace __gnu_pbds;

// #pragma GCC optimize("O3,unroll-loops")
// #pragma GCC target("sse,sse2,ssse3,sse4.1,sse4.2,avx,avx2")

typedef long long ll;
typedef long double ld;

// template<typename T>
// using ordered_set = tree<T, null_type, less<T>, rb_tree_tag, tree_order_statistics_node_update>;

#define all(x) begin(x), end(x)
#define rall(x) rbegin(x), rend(x)
#define ff first
#define ss second
#define _ << " " <<

// #define LOCAL

#ifdef LOCAL
#define err cerr
#else
#define err if (0) cerr
#endif // LOCAL

mt19937 rnd(time(0));

#define int ll

void solve() {
    int n;
    cin >> n;
    vector<int> v(n);
    for (int i = 0; i < n; ++i) {
        cin >> v[i];
    }

    int q, a, b, d;
    cin >> q;
    while (q--) {
        int ans = 0;
        cin >> a >> b >> d;
        for (int i = a; i < b; ++i) {
            ans += (d + v[i] - 1) / v[i];
        }
        cout << ans << "\n";
    }
}

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(nullptr);
    cout.tie(nullptr);
#ifdef LOCAL
    freopen("input.txt", "r", stdin);
    // freopen("output.txt", "w", stdout);
#else
    // freopen("input.txt", "r", stdin);
    // freopen("output.txt", "w", stdout);
#endif // LOCAL
    int tests = 1;
    // cin >> tests;
    while (tests--) {
        solve();
        cout << "\n";
    }
}
```

```
err << endl;  
err << "WorkTime" _ (ld)clock() / (ld)CLOCKS_PER_SEC << endl;  
}
```

Task F ()