Олимпиада СПбГУ по информатике 2021/22 учебного года

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

Task A ()

```cpp
#include <bits/stdc++.h>
using namespace std;

int main() {
    long long n, ans;
    cin >> n;
    map <long long, vector <long long>> a;
    ans = 0;
    for (int i = 0; i < n; ++i) {
        long long k, m;
        cin >> k >> m;
        while (k % 10 == 0) {
            m += 1;
            k /= 10;
        }
        if (a.count(m)) {
            a[m].push_back(k);
        }
        else {
            a[m] = {k};
        }
    }
    long long t = 0;
    for (auto i : a) {
        long long s = 0;
        for (auto j : i.second) {
            s += j;
        }
        if (s % 10 == 0) {
            if (a.count(i.first + 1)) {
                a[i.first + 1].push_back(s / 10);
            }
            else {
                a[i.first + 1] = {s / 10};
            }
            ans = i.first + 1;
        }
        else {
            ans = i.first;
            break;
        }

    }
    cout << ans;
}
```

Task B ()

```cpp
#include <bits/stdc++.h>
using namespace std;

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

    for (int i = n - 1; i >= 0; --i) {

        string s;
        for (int h = 0; h < a[i]; ++h) {
            long long k = 0;
            cout << "Flip_and_wait" << endl;
            while (k < i + 1) {
                cin >> s;
                int t = s.size() - 2;
                k += t / 2;
                if (k < i + 1) {
                    cout << "Wait" << endl;
                }
            }
        }


    }
    cout << "Stop" << endl;
}
```

Task C ()

```cpp
#include <bits/stdc++.h>
using namespace std;

mt19937 rnd(time(0));

int main() {
    int t;
    cin >> t;
    while (t--) {
        string s;
        cin >> s;
        int n = s.size();
        if (n <= 10) {
            int k = 0;
            bool f = false;
            int p = 0;
            for (int i = 0; i < n; ++i) {
                if (s[i] == '?') {
                    f = true;
                }
                else if (s[i] == '0') {
                    k += 1;
                }
                else {
                    p += 1;
                }
            }
            if (n % 2 == 0) {
                if (!f) {
                    if (k == 0) {
                        for (int i = 0; i < n; ++i) {
                            cout << '?';
                        }
                        cout << endl;
                    }
                    else if (k == n) {
                        for (int i = 0; i < n / 2; ++i) {
                            cout << '?';
                        }
                        for (int i = 0; i < n / 2; ++i) {
                            cout << 0;
                        }
                        cout << endl;
                    }
                    else if (k >= n / 2) {
                        for (int i = 0; i < n; ++i) {
                            if (s[i] == '0') {
                                cout << '?';
                            }
                            else {
                                cout << 1;
                            }
                        }
                        cout << endl;
                    }
                    else {
                        for (int i = 0; i < n; ++i) {
                            if (s[i] == '1') {
                                cout << '?';
                            }
                            else {
                                cout << 0;
                            }
                        }
                        cout << endl;
                    }
                }
                else {
                    if (k == 0 && p == 0) {
                        for (int i = 0; i < n; ++i) {
                            cout << 1;
                        }
```

```cpp
                    cout << endl;
                }
                else if (k == n / 2) {
                    for (int i = 0; i < n; ++i) {
                        cout << 0;
                    }
                    cout << endl;
                }
                else {
                    if (k) {
                        for (int i = 0; i < n; ++i) {
                            if (s[i] == '?') {
                                cout << 1;
                            }
                            else {
                                cout << 0;
                            }
                        }
                        cout << endl;
                    }
                    else {
                        for (int i = 0; i < n; ++i) {
                            if (s[i] == '?') {
                                cout << 0;
                            }
                            else {
                                cout << 1;
                            }
                        }
                        cout << endl;
                    }
                }
            }
        }
        else {
            if (!f) {
                if (k == 0) {
                    for (int i = 0; i < n; ++i) {
                        cout << '?';
                    }
                    cout << endl;
                }
                else if (k == n) {
                    for (int i = 0; i < n / 2; ++i) {
                        cout << '?';
                    }
                    for (int i = n / 2; i < n; ++i) {
                        cout << 0;
                    }
                    cout << endl;
                }
                else {
                    if (k > n / 2) {
                        for (int i = 0; i < n; ++i) {
                            if (s[i] == '0') {
                                cout << '?';
                            }
                            else {
                                cout << 1;
                            }
                        }
                        cout << endl;
                    }
                    else {
                        for (int i = 0; i < n; ++i) {
                            if (s[i] == '1') {
                                cout << '?';
                            }
                            else {
                                cout << 0;
                            }
                        }
                        cout << endl;
                    }
                }
```

```cpp
                }
            }
            else {
                if (k == 0 && p == 0) {
                    for (int i = 0; i < n; ++i) {
                        cout << 1;
                    }
                    cout << endl;
                }
                else if (k == (n + 1) / 2) {
                    for (int i = 0; i < n; ++i) {
                        cout << 0;
                    }
                    cout << endl;
                }
                else {
                    if (k) {
                        for (int i = 0; i < n; ++i) {
                            if (s[i] == '?') {
                                cout << 1;
                            }
                            else {
                                cout << 0;
                            }
                        }
                        cout << endl;
                    }
                    else {
                        for (int i = 0; i < n; ++i) {
                            if (s[i] == '?') {
                                cout << 0;
                            }
                            else {
                                cout << 1;
                            }
                        }
                        cout << endl;
                    }
                }
            }
        }
        continue;
    }
    bool f = false;

    int k = 0;
    int p = 0;
    for (int j = 0; j < n; ++j) {
        if (s[j] == '?') {
            f = true;
        }
        if (s[j] == '0') {
            k += 1;
        }
        if (s[j] == '1') {
            p += 1;
        }
    }
    if (f) {
        if (s[0] == '1' && s[1] == '1' && p == 2 && k == 0) {
            for (int i = 0; i < n; ++i) {
                cout << 1;
            }
            cout << endl;
            continue;
        }
        if (k) {
            for (int j = 0; j < n; ++j) {
                if (s[j] == '?') {
                    cout << 1;
                }
                else {
                    cout << 0;
                }
            }
```

```cpp
                }
                cout << endl;
            }
            else {
                for (int j = 0; j < n; ++j) {
                    if (s[j] == '?') {
                        cout << 0;
                    }
                    else {
                        cout << 1;
                    }
                }
                cout << endl;
            }
        }
        else {
            if (p == n) {
                cout << "11";
                for (int i = 2; i < n; ++i) {
                    cout << '?';
                }
                cout << endl;
                continue;
            }
            if (k <= n / 2) {
                for (int j = 0; j < n; ++j) {
                    if (s[j] == '0') {
                        cout << '0';
                    }
                    else {
                        cout << '?';
                    }
                }
                cout << endl;
            }
            else {
                for (int j = 0; j < n; ++j) {
                    if (s[j] == '0') {
                        cout << '?';
                    }
                    else {
                        cout << '1';
                    }
                }
                cout << endl;
            }
        }
    }
}
```

Task D ()

```cpp
#include <bits/stdc++.h>
using namespace std;

const long long mod = 998244353;


int main() {
    long long n, p, s, k;
    cin >> n;
    if (n > 998244351) {
        long long ans;
        long long q = (n + 1) / mod + (n + 1) / (mod * mod);
        long long t = (n + 1) / mod;
        if (t % 2 == 1) {
            ans = 998244352;
        }
        else {
            ans = 1;
        }
        long long h = (n + 1) % mod;
        /*
        if (h > 75e7) {
            ans = (ans * 953297493) % mod;
            for (long long i = 7500000001; i <= h; ++i) {
                ans = (ans * i) % mod;
            }
            cout << q << " " << ans;
            return 0;
        }
        */

        if (h > 5e8 + 1) {

            ans = (ans * 203730522) % mod;
            for (long long i = 500000002; i <= h; ++i) {
                ans = (ans * i) % mod;
            }
            cout << q << "␣" << ans;
            return 0;
        }
        if (h > 3e8 + 1) {
            ans = (ans * 478389955) % mod;
            for (long long i = 300000002; i <= h; ++i) {
                ans = (ans * i) % mod;
            }
            cout << q << "␣" << ans;
            return 0;
        }


        for (long long i = 1; i <= h; ++i) {
            ans = (ans * i) % mod;
        }


        cout << q << "␣" << ans;
        return 0;

    }
    if (n > 5e8) {

        long long ans = 203730522;
        for (long long i = 500000002; i <= (n + 1); ++i) {
            ans = (ans * i) % mod;
        }
        cout << 0 << "␣" << ans;
        return 0;
    }
    if (n > 3e8) {
        long long ans = 478389955;
        for (long long i = 300000002; i <= (n + 1); ++i) {
            ans = (ans * i) % mod;
```

```cpp
        }
        cout << 0 << " " << ans;
        return 0;
    }
    long long ans = 1;
    for (long long i = 2; i <= (n + 1); ++i) {
        ans = (ans * i) % mod;
    }
    cout << 0 << " " << ans;
}
```

Task E ()

```cpp
#include <bits/stdc++.h>
using namespace std;


int main() {
    int n;


    cin >> n;
    vector <long long> a(n);
    for (int i = 0; i < n; ++i) {
        cin >> a[i];
    }
    int q;
    cin >> q;
    while (q--) {
        int l, r, d;
        cin >> l >> r >> d;
        long long ans = 0;
        for (int i = l; i < r; ++i) {
            ans += (d + a[i] - 1) / a[i];
        }
        cout << ans << '\n';
    }
}
```

#include <bits/stdc++.h>
using namespace std;

Task F ()

```cpp
#include <bits/stdc++.h>
using namespace std;

int main() {
    long long n;
    cin >> n;
    vector <pair <long long, long long>> a(n);
    for (int i = 0; i < n; ++i) {
        cin >> a[i].first >> a[i].second;
    }
    vector <vector <int>> b(n + 1, vector <int> (n + 1, 0));
    for (int i = 0; i <= n; ++i) {
        long long l = 0;
        long long r = 0;
        for (int j = i + 1; j <= n; ++j) {
            l += a[j - 1].first;
            r += a[j - 1].second;
            if (l <= 0 && r >= 0) {
                b[i][j] = 1;
            }
        }
    }
    vector <long long> d(n + 1, 1);
    for (int i = 1; i <= n; ++i) {
        for (int j = 0; j < i; ++j) {
            if (b[j][i]) {
                d[i] = max(d[i], 1 + d[j]);
            }
        }
    }
    long long ans = 0;
    for (int i = 0; i <= n; ++i) {
        ans = max(ans, d[i]);
    }
    cout << ans;
}
```