

Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	80	58	8	446

Task A ()

```
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <set>

#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()

using namespace std;

int sz(long long n) {
    return to_string(n).size();
}

void change(pair<int, long long>& p) {
    while (p.second % 10 == 0) {
        p.second /= 10;
        p.first++;
    }
}

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int n;
    cin >> n;
    multiset<pair<int, long long>> s;
    for (int i = 0; i < n; ++i) {
        pair<int, long long> temp;
        cin >> temp.second >> temp.first;
        change(temp);
        s.insert(temp);
    }
    for (int i = 1; i < n; ++i) {
        auto p1 = *s.begin();
        s.erase(s.begin());
        auto p2 = *s.begin();
        s.erase(s.begin());
        if (p1.first != p2.first) {
            cout << p1.first;
            return 0;
        }
        while (p2.first > p1.first) {
            p2.first--;
            p2.second *= 10;
        }
        p1.second += p2.second;
        change(p1);
        s.insert(p1);
    }
    cout << s.begin()->first;
}
```

Task B ()

```
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <set>

#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()

using namespace std;

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int n;
    cin >> n;
    vector<int> k(n);
    for (int i = 0; i < n; ++i)
        cin >> k[i];
    for (int i = n - 1; i >= 0; --i) {
        for (int f = 0; f < k[i]; ++f) {
            cout << "Flip_and_wait" << endl;
            int cnt = 0;
            while (cnt <= i) {
                if (cnt)
                    cout << "Wait" << endl;
                string in;
                cin >> in;
                cnt += (in.size() - 3) / 2;
            }
        }
    }
    cout << "Stop" << endl;
}
```

Task C ()

```
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <set>

#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()

using namespace std;

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int n;
    cin >> n;
    for (int i = 0; i < n; ++i) {
        string s;
        cin >> s;
        int f = 0, n = 0, q = 0;
        for (auto c : s) {
            if (c == '0')
                ++n;
            else if (c == '1')
                ++f;
            else
                ++q;
        }
        if (s.size() % 2 == 0) {
            if (q == 0) {
                if (f == 0) {
                    for (int i = 0; i < s.size() / 2; ++i)
                        s[i] = '0';
                    for (int i = s.size() / 2; i < s.size(); ++i)
                        s[i] = '?';
                }
                else if (n == 0) {
                    for (auto& c : s)
                        c = '?';
                }
                else if (f > n) {
                    for (auto& c : s)
                        if (c == '1')
                            c = '?';
                }
                else {
                    for (auto& c : s)
                        if (c == '0')
                            c = '?';
                }
                cout << s << '\n';
            }
            else {
                if (q == s.size()) {
                    for (auto& c : s)
                        c = '1';
                }
                else if (q == s.size() / 2 && n == s.size() / 2) {
                    for (auto& c : s)
                        c = '0';
                }
                else if (n == 0) {
                    for (auto& c : s)
                        if (c == '?')
                            c = '0';
                }
                else {
                    for (auto& c : s)
                        if (c == '?')
                            c = '1';
                }
                cout << s << '\n';
            }
        }
    }
}
```

```

    }
}
else {
    if (q == 0) {
        if (f == 0) {
            for (int i = 0; i < s.size() / 2; ++i)
                s[i] = '?';
            for (int i = s.size() / 2; i < s.size(); ++i)
                s[i] = '0';
        }
        else if (n == 0) {
            for (auto& c : s)
                c = '?';
        }
        else if (f > n) {
            for (auto& c : s)
                if (c == '1')
                    c = '?';
        }
        else {
            for (auto& c : s)
                if (c == '0')
                    c = '?';
        }
        cout << s << '\n';
    }
    else {
        if (q == s.size()) {
            for (auto& c : s)
                c = '1';
        }
        else if (q == s.size() / 2 && n == s.size() / 2 + 1) {
            for (auto& c : s)
                c = '0';
        }
        else if (n == 0) {
            for (auto& c : s)
                if (c == '?')
                    c = '0';
        }
        else {
            for (auto& c : s)
                if (c == '?')
                    c = '1';
        }
        cout << s << '\n';
    }
}
}
}
}
}

```

Task D ()

```
///#pragma GCC target ("avx2")
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <set>

#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()

using namespace std;

const int MOD = 998244353;

int pwr(int a, int n) {
    int res = 1;
    while (n) {
        if (n % 2)
            res = 1ll * res * a % MOD;
        n /= 2;
        a = 1ll * a * a % MOD;
    }
    return res;
}

int dv(int a, int b) {
    return 1ll * a * pwr(b, MOD - 2) % MOD;
}

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int n;
    cin >> n;
    n++;
    if (n <= MOD / 2) {
        int ans = 1;
        for (int i = 2; i <= n; ++i)
            ans = 1ll * ans * i % MOD;
        cout << "0_" << ans;
    }
    else {
        int ans = 1;
        for (int i = n + 1; i <= MOD - 1; ++i)
            ans = 1ll * ans * i % MOD;
        cout << "0_" << dv(MOD - 1, ans);
    }
}
```

Task E ()

```
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <set>

#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()

using namespace std;

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int n, q;
    cin >> n;
    vector<int> v(n);
    for (int i = 0; i < n; ++i)
        cin >> v[i];
    cin >> q;
    while (q--) {
        int a, b, d;
        cin >> a >> b >> d;
        long long ans = 0;
        for (int j = a; j < b; ++j)
            ans += (d + v[j] - 1) / v[j];
        cout << ans << '\n';
    }
}
```

Task F ()

```
#include <iostream>
#include <vector>
#include <algorithm>
#include <string>
#include <set>

#define all(a) a.begin(), a.end()
#define rall(a) a.rbegin(), a.rend()

using namespace std;

int bit(int n, int ind) {
    return (n >> ind) & 1;
}

int main() {
    ios::sync_with_stdio(0);
    cin.tie(0);
    int n;
    cin >> n;
    vector<int> l(n), r(n);
    for (int i = 0; i < n; ++i)
        cin >> l[i] >> r[i];
    vector<vector<pair<long long, long long>>> dif(n, vector<pair<long long, long long>>(n));
    for (int i = 0; i < n; ++i) {
        dif[i][i] = { l[i], r[i] };
        for (int j = i + 1; j < n; ++j)
            dif[i][j] = { dif[i][j - 1].first + l[j], dif[i][j - 1].second + r[j] };
    }
    int ans = 1;
    for (int msk = 0; msk < (1 << (n + 1)); ++msk) {
        bool ok = true;
        int hah = 0;
        for (int i = 0; i <= n; ++i)
            if (bit(msk, i))
                hah++;
        for (int i = 0; i < n; ++i)
            for (int j = i + 1; j <= n; ++j)
                if (bit(msk, i) && bit(msk, j) && (dif[i][j - 1].first > 0 || dif[i][j - 1].second < 0))
                    ok = false;
        if (ok)
            ans = max(ans, hah);
    }
    cout << ans;
}
```