Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	80	58	0	438

Task A ()

```cpp
#include <iostream>
#include <vector>
#include <algorithm>

using namespace std;

int main()
{
    ios::sync_with_stdio(0);
    long long n;
    cin >> n;
    vector<pair<long long, long long>> ch;
    for (int i = 0; i < n; i++) {
        long long a, b;
        cin >> a >> b;
        long long k = 0;
        while (a > 0) {
            if (a % 10 != 0) {
                ch.push_back(make_pair(b + k, a % 10));
            }
            k++;
            a /= 10;
        }
    }
    n = ch.size();
    sort(ch.begin(), ch.end());
    long long s = 0;
    int i = 0;
    long long ans = ch[i].first - 1;
    while (s % 10 == 0) {
        s /= 10;
        ans++;
        if (i < n && ans == ch[i].first) {
            s += ch[i].second;
            i++;
            for (; i < n; i++) {
                if (ch[i].first == ch[i - 1].first) {
                    s += ch[i].second;
                }
                else {
                    break;
                }
            }
        }
    }
    cout << ans;

}
```

Task B ()

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

using namespace std;

int main()
{
    ios::sync_with_stdio(0);
    long long n;
    cin >> n;
    vector<long long> k(n);
    for (int i = 0; i < n; i++) {
        cin >> k[i];
    }
    for (int i = n - 1; i >= 0; i--) {
        while (k[i] != 0) {
            cout << "Flip and wait" << endl;
            long long kol = 0;
            while (kol <= i) {
                if (kol != 0) {
                    cout << "Wait\n";
                }
                string s;
                cin >> s;
                kol += s.size() - 3 >> 1;
            }
            k[i]--;
        }
    }
    cout << "Stop\n";

}
```

Task C ()

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

using namespace std;

int main()
{
    ios::sync_with_stdio(0);
    long long n;
    cin >> n;

    while (n--) {
        string s;
        cin >> s;
        if (s.size() == 1) {
            cout << s;
        }
        else {
            string ans = "";
            if (s[0] == '?' || s[1] == '?') {
                for (int i = 1; i < s.size(); i += 2) {
                    if (s[i - 1] == '?' && s[i] == '0') {
                        ans = ans + "10";
                    }
                    if (s[i - 1] == '?' && s[i] == '1') {
                        ans = ans + "01";
                    }
                    if (s[i - 1] == '1' && s[i] == '?') {
                        ans = ans + "11";
                    }
                    if (s[i - 1] == '0' && s[i] == '?') {
                        ans = ans + "00";
                    }
                }
            }
            else {
                for (int i = 1; i < s.size(); i += 2) {
                    if (s[i] == '0') {
                        if (s[i - 1] == '0') {
                            ans = ans + "0?";
                        }
                        else {
                            ans = ans + "?0";
                        }
                    }
                    if (s[i] == '1') {
                        if (s[i - 1] == '0') {
                            ans = ans + "?1";
                        }
                        else {
                            ans = ans + "1?";
                        }
                    }
                }
            }
            if (s.size() & 1) {
                ans = ans + s[s.size() - 1];
            }
            cout << ans;
        }

        cout << "\n";
    }

}
```

Task D ()

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

using namespace std;

int main(){
    long long n;
    long long ans = 0;
    const long long c = 998244353;
    cin >> n;
    if (n == 0) {
        cout << 0 << ' ' << 1;
    }
    if (n == 1) {
        cout << 0 << ' ' << 2;
        return 0;
    }
    if (n == 2) {
        cout << 0 << ' ' << 6;
        return 0;
    }
    long long i = 3;
    ans = 6;
    long long l_ans = 2;
    long long ans2 = 0;
    long long j = 9;
    if (n >= 600000000) {
        i = 600000001;
        j = 1697364169;
        l_ans = 511621808;
        ans = 533107751;
        ans2 = 149740636012688144 % c;
    }
    for (; i <= n; i++) {
        while (j >= c) {
            j -= c;
        }
        long long th = j * l_ans;
        l_ans = ans;
        ans2 += (ans + th) / c;
        ans = (ans + th) % c;
        j += i * 2 + 1;
    }
    if (ans == 0) {
        cout << 1 << ' ' << ans2 % c;
    }
    else {
        cout << 0 << ' ' << ans;
    }
}
```

Task E ()

```cpp
#include <iostream>
#include <vector>

using namespace std;

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

Task F ()

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

using namespace std;
long long n;
vector<pair<long long, long long>> poi;
vector<long long> zn;
long long rec(long long now) {
    if (now == n) {
        vector<long long> a(10000, 0);
        long long kol = 0;
        for (int i = 0; i <= n; i++) {
            a[zn[i] + 1000]++;
            kol = max(kol, a[zn[i]+1000]);
        }
        return kol;
    }
    long long ans = 0;
        zn[now+1] = zn[now] - poi[now].first;
        ans = max(ans, rec(now + 1));
        zn[now + 1] = zn[now] - poi[now].second;
        ans = max(ans, rec(now + 1));
        if (poi[now].first <= 0 && poi[now].second >= 0) {
            zn[now + 1] = zn[now];
            ans = max(ans, rec(now + 1));
        }
    return ans;
}
int main()
{
    ios::sync_with_stdio(0);

    cin >> n;
    poi.resize(n);
    zn.resize(n + 1);
    zn[0] = 0;
    for (int i = 0; i < n; i++) {
        cin >> poi[i].first >> poi[i].second;
    }
    cout << rec(0) << endl;
}
```