# Олимпиада СПбГУ по информатике 2021/22 учебного года

| A | B | C | D | E | F | Sum |
|---|---|---|---|---|---|-----|
| 100 | 100 | 100 | 60 | 58 | 8 | 426 |

## Task A ()

```cpp
#include <iostream>
#include <vector>
#include <map>
#include <set>
#include <cmath>
#include <algorithm>
#include <iomanip>
#include <deque>


#define int long long
using namespace std;



signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    int n;
    cin >> n;
    vector <pair<int, int>> nz;
    for (int i = 0; i < n; i++) {
        int a, b;
        cin >> a >> b;
        while (a % 10 == 0) {
            b++;
            a /= 10;
        }
        while (a / 10 != 0) {
            int f = a % 10;
            nz.push_back({b, f});
            b++;
            a /= 10;
        }
        nz.push_back({b, a});
    }
    sort(nz.begin(), nz.end());
    int idd = 0;
    int ch = 1;
    int now = 0;
    int ans = 0;
    while (ch and idd != nz.size()) {
        int st = nz[idd].first;
        int sti = idd;
        int su = now;
        while (idd != nz.size() and st == nz[idd].first) {
            su += nz[idd].second;
            idd++;
        }
        ans = st;
        if (su % 10 != 0) {
            ch = 0;
            break;
        }
        while (su != 0 and (idd == nz.size() or nz[idd].first != ans)) {
```

```cpp
                su /= 10;
                ans++;
                if ((idd == nz.size() or nz[idd].first != ans) and su % 10 != 0) {
                    ch = 0;
                    break;
                }
            }
            now = su;
        }
        cout << ans << "\n";
}
```

## Task B ()

```cpp
#include <iostream>
#include <vector>
#include <map>
#include <set>
#include <cmath>
#include <algorithm>
#include <iomanip>
#include <deque>


#define int long long
using namespace std;



signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    int n;
    cin >> n;
    vector <int> k(n);
    for (int i = 0; i < n; i++) {
        cin >> k[i];
    }
    int idd = n - 1;
    int ch = 1;
    int pr = -1;
    while (ch) {
        while (idd != -1 and k[idd] == 0) {
            idd--;
        }
        if (idd == -1) {
            ch = 0;
        }
        else {
            cout << "Flip_and_wait\n";
            cout.flush();
            int su = 0;
            while (su <= idd) {
                string nw;
                cin >> nw;
                if (nw == "Burn" or nw == "Tired\n") {
                    exit(0);
                }
                su += (nw.size() - 3) / 2;
                if (su <= idd) {
                    cout << "Wait\n";
                    cout.flush();
                } else {
                    k[idd]--;
                    break;
                }
            }
        }
    }
    cout << "Stop\n";
    cout.flush();
}
```

## Task C ()

```cpp
#include <iostream>
#include <vector>
#include <map>
#include <set>
#include <cmath>
#include <algorithm>
#include <iomanip>
#include <deque>


#define int long long
using namespace std;



signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    int amm;
    cin >> amm;
    while (amm--) {
        string s;
        cin >> s;
        int cn = 0;
        int n = s.size();
        int cnt1 = 0;
        int cnt0 = 0;
        for (auto nw : s) {
            if (nw == '?') {
                cn++;
            }
            else if (nw == '0') {
                cnt0++;
            }
            else {
                cnt1++;
            }
        }
        if (cn == 0) {
            for (int i = 0; i < n; i += 2) {
                if (s[i] != s[i + 1]) {
                    s[i + 1] = '?';
                }
                else {
                    s[i] = '?';
                }
            }
            cout << s << "\n";
        }
        else {
            for (int i = 0; i < n; i+= 2) {
                if (s[i] == '?') {
                    s[i] = s[i + 1];
                }
                else {
                    if (s[i] == '0') {
                        s[i + 1] = '1';
                    }
                    else {
                        s[i + 1] = '0';
                    }
                }
            }
            cout << s << "\n";
        }
    }
}
```

## Task D ()

```cpp
#include <iostream>
#include <vector>
#include <map>
#include <set>
#include <cmath>
#include <algorithm>
#include <iomanip>
#include <deque>


using namespace std;

const long long mod = 998244353;
#pragma("O3")
#pragma("fast-math")


long long bp(long long a, long long b) {
    long long ret = 1;
    while (b != 0) {
        if (b % 2 == 0) {
            a *= a;
            a %= mod;
        }
        else {
            ret *= a;
            b--;
            ret %= mod;
        }
        b /= 2;
    }
    return ret;
}




signed main() {
    long long n;
    cin >> n;
    if (n <= 500000000) {
        long long ans = 1;
        for (long long i = n + 1; i >= 1; i--) {
            ans *= i;
            if (ans > mod) {
                ans %= mod;
            }
        }
        cout << 0 << "_" << ans << "\n";
    }
    else {
        long long fc500 = 1;
        long long anss = -1;
        for (long long i = 1; i <= 500000000; i++) {
            fc500 *= i;
            if (fc500 > mod) {
                fc500 %= mod;
            }
            if (i == mod - 500000001) {
                anss = fc500;
            }
        }
        long long ans = fc500;
        long long h = anss;
        long long se;
        if (n + 2 == mod) {
            se = 1;
        } else {
            se = bp(mod - (n + 1), mod - 2);
        }
        ans *= ((long long) h * se) % mod;
        ans %= mod;
```

```cpp
        cout << 0 << "_" << ans << "\n";
    }
}
```

## Task E ()

```cpp
#include <iostream>
#include <vector>
#include <map>
#include <set>
#include <cmath>
#include <algorithm>
#include <iomanip>
#include <deque>


#define int long long
using namespace std;



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

## Task F ()

```cpp
#include <iostream>
#include <vector>
#include <map>
#include <set>
#include <cmath>
#include <algorithm>
#include <iomanip>
#include <deque>


using namespace std;

#define int long long

const int mod = 998244353;
#pragma("O3")
#pragma("fast-math")




signed main() {
    int n;
    cin >> n;
    n = n;
    vector <vector <int>> o(n);
    for (int i = 0; i < n; i++) {
        int l, r;
        cin >> l >> r;
        o[i] = {l, r};
    }
    vector <vector <int>> dp(n + 1, vector <int> (4100, -1));
    dp[0][2000] = 1;
    for (int i = 1; i < n + 1; i++) {
        int ls = 0;
        int rs = 0;
        ls += o[i - 1][0] + 2000;
        rs += o[i - 1][1] + 2000;
        for (int j = i - 1; j > -1; j--) {
            if (ls <= 2000 and rs >= 2000) {
                for (int k = 0; k < 4100; k++) {
                    if (dp[j][k] != -1) {
                        dp[i][k] = max(dp[j][k] + 1, dp[i][k]);
                    }
                }
            }
            if (j != 0) {
                ls += o[j - 1][0];
                rs += o[j - 1][1];
            }
        }
        for (int k = ls; k <= rs; k++) {
            dp[i][k] = max(dp[i][k], (long long)1);
        }
    }
    int mx = 1;
    for (int i = 0; i < 4100; i++) {
        for (int lt = 0; lt < n + 1; lt++) {
            mx = max(mx, dp[lt][i]);
        }
    }
    cout << mx << "\n";
}
```