

Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	40	58	31	429

Task A ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <algorithm>
#include <cmath>
#include <random>
#include <chrono>
#include <set>

using namespace std;

#define v vector
#define int long long
#define len(a) (int)a.size()
#define all(a) a.begin(), a.end()

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

    map<int, int> mp;

    int n; cin >> n;
    while (n--) {
        int a, b; cin >> a >> b;
        while (a % 10 == 0) {
            a /= 10;
            b++;
        }
        int it = b;
        while (a > 0) {
            mp[it] += a % 10;
            a /= 10;
            it++;
        }
    }
    v<pair<int, int>> lst;
    for (auto [key, val] : mp) {
        lst.push_back({key, val});
    }
    reverse(all(lst));
    int ans = -1;
    while (len(lst) > 0) {
        auto [key, val] = lst.back();
        lst.pop_back();
        if (val % 10 != 0) {
            ans = key;
            break;
        }
        if (len(lst) > 0 && lst[len(lst) - 1].first == key + 1) {
            lst[len(lst) - 1].second += val / 10;
        } else {

```

```
        lst.push_back({key + 1, val / 10});
    }
}
cout << ans << "\n";
return 0;
}
```

Task B ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <algorithm>
#include <cmath>
#include <random>
#include <chrono>

using namespace std;

#define v vector
#define int long long
#define len(a) (int)a.size()
#define all(a) a.begin(), a.end()
#define LOCAL

int n;
v<int> k;

int ask() {
    string bck; cin >> bck;
    if (bck[1] != 'e') {
        return 0;
    }
    int cnt = 0;
    for (auto j : bck) {
        if (j == 'e') {
            cnt ++;
        }
    }
    cnt = cnt / 2;
    return cnt;
}

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

    cin >> n;
    k.resize(n);
    for (int i = 0; i < n; i++) cin >> k[i];
    int sm = 0;
    for (auto j : k) sm += j;

    cout << "Flip_and_wait" << endl;
    for (int it = n - 1; it >= 0; it--) {
        for (int j = 0; j < k[it]; j++) {
            sm--;

            int cur = it + 1;
            while (cur > 0) {
                int val = ask();
                if (val == 0) return 0;
                cur -= val;
                if (cur <= 0) {
                    if (sm == 0) {
                        cout << "Stop" << endl;
                        return 0;
                    } else {
                        cout << "Flip_and_wait" << endl;
                    }
                } else {
                    cout << "Wait" << endl;
                }
            }
        }
    }

    return 0;
}
```


Task C ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <algorithm>
#include <cmath>
#include <random>
#include <chrono>

using namespace std;

#define v vector
#define int long long
#define len(a) (int)a.size()
#define all(a) a.begin(), a.end()

void recovery(string &s) {
    int k = len(s) / 2;
    for (int i = 0; i < k; i++) {
        if (s[2 * i + 1] == '?') {
            s[2 * i + 1] = (char)('0' + ('1' - s[2 * i]));
        } else {
            s[2 * i] = s[2 * i + 1];
        }
    }
}

void relax(string &s) {
    int k = len(s) / 2;
    for (int i = 0; i < k; i++) {
        if (s[2 * i + 1] != s[2 * i]) {
            s[2 * i + 1] = '?';
        } else {
            s[2 * i] = '?';
        }
    }
}

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

    int t; cin >> t;
    while (t--) {
        string s; cin >> s;
        bool ok = false;
        for (auto j : s) {
            if (j == '?') {
                ok = true;
                break;
            }
        }
        if (ok) {
            recovery(s);
        } else {
            relax(s);
        }
        cout << s << "\n";
    }
    return 0;
}
```

Task D ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <algorithm>
#include <cmath>
#include <random>
#include <chrono>

using namespace std;

#define v vector
#define int long long
#define len(a) (int)a.size()
#define all(a) a.begin(), a.end()

const int base = 998244353;

void push(v<int> &res) {
    int it = 0;
    while (res[it] >= base) {
        if (it + 1 >= len(res)) {
            res.push_back(0);
        }
        res[it + 1] += res[it] / base;
        res[it] %= base;
    }
}

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

    int n; cin >> n;

    v<int> A = {1};
    v<int> B = {2};
    for (int i = 2; i <= n; i++) {
        v<int> dp = A;
        int sz = len(dp);
        for (int j = 0; j < sz; j++) {
            dp[j] *= i;
        }
        push(dp);
        for (int j = 0; j < sz; j++) {
            dp[j] *= i;
        }
        push(dp);

        v<int> C = B;
        for (int j = 0; j < len(dp); j++) {
            if (j >= len(C)) {
                C.push_back(0);
            }
            C[j] += dp[j];
        }
        push(C);
        A = B;
        B = C;
    }

    int it = 0;
    while (B[it] == 0) {
        it++;
    }
    cout << it << " " << B[it] << "\n";
    return 0;
}
```

Task E ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <algorithm>
#include <cmath>
#include <random>
#include <chrono>

using namespace std;

#define v vector
#define int long long
#define len(a) (int)a.size()
#define all(a) a.begin(), a.end()

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

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

Task F ()

```
#include <iostream>
#include <vector>
#include <set>
#include <map>
#include <unordered_map>
#include <algorithm>
#include <cmath>
#include <random>
#include <chrono>
#include <set>

using namespace std;

#define v vector
#define int long long
#define len(a) (int)a.size()
#define all(a) a.begin(), a.end()

const int INF = 2e9;

signed main() {
    ios_base::sync_with_stdio(0);
    cin.tie(0);
    cout.tie(0);

    int n; cin >> n;
    v<pair<int, int>> lst;
    for (int i = 0; i < n; i++) {
        int l, r; cin >> l >> r;
        lst.push_back({l, r});
    }
    v<int> dp(n + 1, 0);
    dp[0] = 0;

    v<int> l(n + 1);
    l[0] = 0;
    for (int i = 1; i <= n; i++) {
        l[i] = l[i - 1] + lst[i - 1].first;
    }
    v<int> r(n + 1);
    r[0] = 0;
    for (int i = 1; i <= n; i++) {
        r[i] = r[i - 1] + lst[i - 1].second;
    }
    /*v<int> opt(n + 1, -INF);
    for (int i = 1; i <= n; i++) {
        for (int j = 0; j <= n; j++) {
            if (i == j) continue;
            if (j < i && l[i] <= l[j] && r[j] <= r[i]) {
                opt[i] = max(opt[i], j);
            }
        }
    }
    for (int i = 1; i <= n; i++) {
        if (opt[i] == -INF) {
            dp[i] = 0;
        } else {
            dp[i] = dp[opt[i]] + 1;
        }
    }
    */

    for (int i = 1; i <= n; i++) {
        int L = 0, R = 0;
        for (int j = i - 1; j >= 0; j--) {
            L += lst[j].first;
            R += lst[j].second;
            if (L <= 0 && 0 <= R) {
                dp[i] = max(dp[i], dp[j] + 1);
            }
        }
    }
}
```



```
/*for (auto j : dp) {  
    cout << j << " ";  
}  
cout << "\n";*/  
cout << *max_element(all(dp)) + 1 << "\n";  
return 0;  
}
```