

Олимпиада СПбГУ по информатике 2021/22 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	58	0	458

Task A ()

```
#include <iostream>
#include <vector>
#include <array>
#include <string>
#include <algorithm>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <cmath>
#include <deque>
#include <iomanip>
#include <fstream>
#include <ctime>
#include <random>
#include <queue>
#include <bitset>
#include <math.h>

using namespace std;

typedef long long ll;
typedef long double ld;
typedef string str;
typedef double type;

template<typename T>istream& operator>>(istream& in, vector<T>& a) { for (int i = 0; i < a.size(); ++i) in >> a[i]; return in; }
template<typename T>ostream& operator<<(ostream& out, vector<T>& a) { for (T i : a) out << i << ' '; return out; }

template<typename T1, typename T2>istream& operator>>(istream& in, pair<T1, T2>& p) { in >> p.first >> p.second; return in; }
template<typename T1, typename T2>ostream& operator<<(ostream& out, pair<T1, T2>& p) { out << p.first << ' ' << p.second; return out; }

#define all(x) x.begin(), x.end()
#define range(i, n) for (int i = 0; i < n; ++i)
#define rrange(i, n) for (int i = n - 1; i >= 0; --i)
#define CF(x) int x; cin >> x; while(x--)
#define LLONG_MAX 9223372036854775807ll
#define INT_MAX 2147483647
#define INT_MIN -2147483648
#define mp make_pair

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);
    cout.setf(ios::fixed);
    cout.precision(10);

    int n;
    cin >> n;
    vector<pair<int, int>> a(n);
    cin >> a;
```

```

map<int , int> d;
for (auto i : a) {
    str s = to_string(i.first);
    for (int j = 0; j < s.size(); ++j) {
        d[i.second + j] += i.first%10;
        i.first /= 10;
    }
}
//for (auto i : d) {
//    cout << i << '\n';
//}
int ans = 0;
while (d.size()) {
    auto tmp = *d.begin();
    d.erase(d.begin());
    ans = tmp.first;
    if (tmp.second % 10) break;
    d[tmp.first + 1] += tmp.second / 10;
}
cout << ans;
}

```

Task B ()

```
#include <iostream>
#include <vector>
#include <array>
#include <string>
#include <algorithm>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <cmath>
#include <deque>
#include <iomanip>
#include <fstream>
#include <ctime>
#include <random>
#include <queue>
#include <bitset>
#include <math.h>

using namespace std;

typedef long long ll;
typedef long double ld;
typedef string str;
typedef double type;

template<typename T>istream& operator>>(istream& in, vector<T>& a) { for (int i = 0; i < a.size(); ++i) in >> a[i]; return in; }
template<typename T>ostream& operator<<(ostream& out, vector<T>& a) { for (T i : a) out << i << ' '; return out; }

template<typename T1, typename T2>istream& operator>>(istream& in, pair<T1, T2>& p) { in >> p.first >> p.second; return in; }
template<typename T1, typename T2>ostream& operator<<(ostream& out, pair<T1, T2>& p) { out << p.first << ' ' << p.second; return out; }

#define all(x) x.begin(),x.end()
#define range(i,n) for (int i=0;i<n;++i)
#define rrange(i,n) for (int i=n-1;i>=0;--i)
#define CF(x) int x;cin >> x;while(x--)
#define LLONG_MAX 9223372036854775807ll
#define INT_MAX 2147483647
#define INT_MIN -2147483648
#define mp make_pair

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);
    cout.setf(ios::fixed);
    cout.precision(10);

    str flip = "Flip_and_wait";
    str wait = "Wait";

    int n;
    cin >> n;
    vector<int> a(n);
    cin >> a;
    int t = *max_element(all(a));
    int ind = -1;
    for (int i = n-1; i >=0; --i) {
        while (a[i]) {
            a[i] -= 1;
            cout << flip << endl;
            int k = 0;
            str s;
            cin >> s;
            k += count(all(s), 'e') / 2;
            while (k <= i) {
                cout << wait << endl;
                cin >> s;
            }
        }
    }
}
```

```

        k += count(all(s), 'e') / 2;
    }
    if (a[i]) ind = i;
}
if (ind != -1) {
    cout << flip << endl;
    int k = 0;
    str s;
    cin >> s;
    k += count(all(s), 'e') / 2;
    while (k <= ind) {
        cout << wait << endl;
        cin >> s;
        k += count(all(s), 'e') / 2;
    }
}
cout << "Stop";
}

```

Task C ()

```
#include <iostream>
#include <vector>
#include <array>
#include <string>
#include <algorithm>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <cmath>
#include <deque>
#include <iomanip>
#include <fstream>
#include <ctime>
#include <random>
#include <queue>
#include <bitset>
#include <math.h>

using namespace std;

typedef long long ll;
typedef long double ld;
typedef string str;
typedef double type;

template<typename T>istream& operator>>(istream& in, vector<T>& a) { for (int i = 0; i < a.size(); ++i) in >> a[i]; return in; }
template<typename T>ostream& operator<<(ostream& out, vector<T>& a) { for (T i : a) out << i << ' '; return out; }

template<typename T1, typename T2>istream& operator>>(istream& in, pair<T1, T2>& p) { in >> p.first >> p.second; return in; }
template<typename T1, typename T2>ostream& operator<<(ostream& out, pair<T1, T2>& p) { out << p.first << ' ' << p.second; return out; }

#define all(x) x.begin(), x.end()
#define range(i, n) for (int i = 0; i < n; ++i)
#define rrange(i, n) for (int i = n - 1; i >= 0; --i)
#define CF(x) int x; cin >> x; while(x--)
#define LLONG_MAX 9223372036854775807ll
#define INT_MAX 2147483647
#define INT_MIN -2147483648
#define mp make_pair

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);
    cout.setf(ios::fixed);
    cout.precision(10);

    CF(____) {
        str s;
        cin >> s;
        int n = s.size();
        if (find(all(s), '?') != s.end()) {
            int c0 = count(all(s), '0');
            int c1 = count(all(s), '1');
            range(i, n) {
                if (s[i] == '?') {
                    if (c0 == 0 && c1 == 0)
                        s[i] = '1';
                    else if (c0 == 0)
                        s[i] = '0';
                    else if (c1 == 0)
                        s[i] = '0';
                    else
                        s[i] = '1';
                }
            }
        }
        cout << s << '\n';
    }
}
```

```

    }
    else {
        int c0 = count(all(s), '0');
        int c1 = n - c0;
        int f = 0;
        range(i, n) {
            if (c1 == n)
                s[i] = '?';
            else if (c0 >= c1 && s[i] == '0')
                s[i] = '?';
            else if (c1 > c0 && s[i] == '1') {
                if (f) s[i] = '?';
                else f = 1;
            }
        }
        if (c1 == 0) {
            s[0] = '0';
        }
        cout << s << '\n';
    }
}

```

Task D ()

```
#include <iostream>
#include <vector>
#include <array>
#include <string>
#include <algorithm>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <cmath>
#include <deque>
#include <iomanip>
#include <fstream>
#include <ctime>
#include <random>
#include <queue>
#include <bitset>
#include <math.h>

using namespace std;

typedef long long ll;
typedef long double ld;
typedef string str;
typedef double type;

template<typename T>istream& operator>>(istream& in, vector<T>& a) { for (int i = 0; i < a.size(); ++i) in >> a[i]; return in; }
template<typename T>ostream& operator<<(ostream& out, vector<T>& a) { for (T i : a) out << i << ' '; return out; }

template<typename T1, typename T2>istream& operator>>(istream& in, pair<T1, T2>& p) { in >> p.first >> p.second; return in; }
template<typename T1, typename T2>ostream& operator<<(ostream& out, pair<T1, T2>& p) { out << p.first << ' ' << p.second; return out; }

#define all(x) x.begin(),x.end()
#define range(i,n) for (int i=0;i<n;++i)
#define rrange(i,n) for (int i=n-1;i>=0;--i)
#define CF(x) int x;cin >> x;while(x--)
#define LLONG_MAX 9223372036854775807ll
#define INT_MAX 2147483647
#define INT_MIN -2147483648
#define mp make_pair

ll mod = 998244353ll;

void stp(ll n) {
    ll ans = 1;
    range(i, n + 1) {
        ans *= (i + 1);
        ans %= mod;
    }
    cout << n/mod << ' ' << ans % mod << '\n';
}

ll fpow(ll a, ll n) {
    if (n == 0) return 1;
    ll tmp = fpow(a, n / 2);
    tmp *= tmp;
    tmp %= mod;
    if (n % 2) {
        tmp *= a;
        tmp %= mod;
    }
    return tmp;
}

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

```

cout.setf(ios::fixed);
cout.precision(10);

//stp(998244352ll);
//cout << '\n';

ll n;
cin >> n;
n++;
vector<int> ex;
ll ans = 1;
ll ans1 = n / mod + n / (mod * mod);
ll kek = n / mod;
n %= mod;
vector<ll> a = {
    1,
    808258749 ,
    117153405 ,
    761699708 ,
    573994984 ,
    62402409 ,
    511621808 ,
    242726978 ,
    887890124 ,
    875880304
};
ll srt = 0;
range(i, a.size()) {
    if (i * ll(1e8) <= n) {
        srt = i;
        ans = a[i];
    }
}
for (ll i = srt * ll(1e8)+1; i < n + 1; ++i) {
    if (i % mod)
        ans *= i;
    if (ans >= mod)
        ans %= mod;
}
//cout << n << ' ' << ans << '\n';
cout << ans1 << '⌋' << ans*fpow(998244352ll , kek)%mod << '\n';
}

```


Task E ()

```
#include <iostream>
#include <vector>
#include <array>
#include <string>
#include <algorithm>
#include <set>
#include <map>
#include <unordered_map>
#include <unordered_set>
#include <cmath>
#include <deque>
#include <iomanip>
#include <fstream>
#include <ctime>
#include <random>
#include <queue>
#include <bitset>
#include <math.h>

using namespace std;

typedef long long ll;
typedef long double ld;
typedef string str;
typedef double type;

template<typename T>istream& operator>>(istream& in, vector<T>& a) { for (int i = 0; i < a.size(); ++i) in >> a[i]; return in; }
template<typename T>ostream& operator<<(ostream& out, vector<T>& a) { for (T i : a) out << i << ' '; return out; }

template<typename T1, typename T2>istream& operator>>(istream& in, pair<T1, T2>& p) { in >> p.first >> p.second; return in; }
template<typename T1, typename T2>ostream& operator<<(ostream& out, pair<T1, T2>& p) { out << p.first << ' ' << p.second; return out; }

#define all(x) x.begin(),x.end()
#define range(i,n) for (int i=0;i<n;++i)
#define rrange(i,n) for (int i=n-1;i>=0;--i)
#define CF(x) int x;cin >> x;while(x--)
#define LLONG_MAX 9223372036854775807ll
#define INT_MAX 2147483647
#define INT_MIN -2147483648
#define mp make_pair

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);
    cout.setf(ios::fixed);
    cout.precision(10);

    int n;
    cin >> n;
    vector<int>u(n);
    cin >> u;
    CF(____) {
        int a, b;
        cin >> a >> b;
        int d;
        cin >> d;
        ll ans = 0;
        for (int i = a + 1; i <= b; ++i) {
            ans += (d+u[i-1]-1) / u[i-1];
        }
        cout << ans << '\n';
    }
}
```

Task F ()