

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 <algorithm>

using namespace std;

int main()
{
    long long int n;
    cin >> n;
    vector<pair<long long int, long long int>> a(n);
    for(long long int i = 0; i < n; ++i){
        cin >> a[i].second >> a[i].first;
    }
    vector<long long int> s10(18, 1);
    for(long long int i = 1; i < 18; ++i){
        s10[i] = s10[i-1]*10;
    }
    sort(a.begin(), a.end());
    long long int st = a[0].first;
    long long int cur = a[0].second;
    for(long long int i = 1; i < n; ++i){
        while(cur > 0 && cur%10 == 0){
            cur /= 10;
            st++;
        }
        if(a[i].first > st && cur != 0){
            cout << st;
            return 0;
        }else{
            if(cur == 0){
                st = a[i].first;
                cur = a[i].second;
            }else{
                cur = cur * s10[st-a[i].first] + a[i].second;
                st = a[i].first;
            }
        }
    }
    while(cur > 0 && cur%10 == 0){
        cur /= 10;
        st++;
    }
    cout << st;
    return 0;
}
```

Task B ()

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

using namespace std;

int main()
{
    int n;
    cin >> n;
    vector<int> a(n);
    string s;
    int ch = 0;
    for (int i = 0; i < n; ++i){
        cin >> a[i];
        if (a[i] != 0 && ch == 0){
            ch = i+1;
        }
    }
    if (ch == 0){
        cout << "Stop" << endl;
        return 0;
    } else {
        cout << "Flip_and_wait" << endl;
    }
    int cur = 0;
    for (int i = n-1; i > -1; --i){
        while (a[i] > 0){
            cin >> s;
            cur += (s.size()-3)/2;
            if (cur >= i+1){
                if ((i != ch-1 || a[i] != 1)){
                    cout << "Flip_and_wait" << endl;
                }
                a[i]--;
                cur = 0;
            } else {
                cout << "Wait" << endl;
            }
        }
    }
    cout << "Stop" << endl;
    return 0;
}
```

Task C ()

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

using namespace std;

int main()
{
    int n;
    cin >> n;
    for (int i = 0; i < n; ++i){
        string s;
        cin >> s;
        string ot = "";
        for (int j = 0; j < s.size(); j += 2){
            if (j+1 < s.size()){
                char x = s[j];
                char y = s[j+1];
                if (x == '1' && y == '1'){
                    ot += "1?";
                }
                if (x == '1' && y == '0'){
                    ot += "?0";
                }
                if (x == '0' && y == '1'){
                    ot += "?1";
                }
                if (x == '0' && y == '0'){
                    ot += "0?";
                }
                if (x == '?' && y == '1'){
                    ot += "01";
                }
                if (x == '?' && y == '0'){
                    ot += "10";
                }
                if (x == '0' && y == '?'){
                    ot += "00";
                }
                if (x == '1' && y == '?'){
                    ot += "11";
                }
            } else {
                ot += s[j];
            }
        }
        cout << ot << endl;
    }
    return 0;
}
```

Task D ()

```
#include <iostream>
#include <vector>
#include <cmath>

using namespace std;

long long int mod = 998244353;

int main()
{
    long long int n;
    cin >> n;
    //n = 2*mod-2;
    long long int fact = 1;
    vector<long long int> factor(11);
    factor = {1, 656466042, 388653856, 43736361, 619654534, 173167436, 5066314, 199050241,
              91231272, 237011908, 998244352};
    vector<long long int> zn(11);
    for(long long int i = 0; i < 10; ++i){
        zn[i] = mod/10 * i;
    }
    zn[10] = mod;
    if(n < mod-1){
        long long int op = 0;
        long long int opi = 0;
        for(long long int i = 0; i < 11; ++i){
            if(zn[i] <= n){
                op = zn[i];
                opi = i;
            }
        }
        long long int fact = factor[opi];
        for(long long int i = op+1; i <= n+1; ++i){
            fact *= i;
            fact = fact % mod;
        }
        cout << 0 << "┘" << fact;
    } else {
        long long int u1 = (n+1)/mod + (n+1)/(mod*mod);
        long long int u2 = (n+1)/mod;
        n = (n+1) % mod;
        long long int op = 0;
        long long int opi = 0;
        for(long long int i = 0; i < 11; ++i){
            if(zn[i] <= n){
                op = zn[i];
                opi = i;
            }
        }
        long long int fact = factor[opi];
        for(long long int i = op+1; i <= n; ++i){
            fact *= i;
            fact = fact % mod;
        }
        if(u2%2 == 0){
            cout << u1 << "┘" << fact;
        } else {
            cout << u1 << "┘" << mod-fact;
        }
    }
    return 0;
}
```

Task E ()

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

using namespace std;

int main()
{
    int n;
    cin >> n;
    vector<int> e(n);
    for(int i = 0; i < n; ++i){
        cin >> e[i];
    }
    int q;
    cin >> q;
    for(int w = 0; w < q; ++w){
        int a, b, c;
        cin >> a >> b >> c;
        long long int ans = 0;
        for(int i = a; i < b; ++i){
            ans += (c+e[i]-1)/e[i];
        }
        cout << ans << endl;
    }
    return 0;
}
```

Task F ()

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

using namespace std;

int main()
{
    long long int n;
    cin >> n;
    n++;
    vector<long long int> l(n);
    vector<long long int> r(n);
    for(long long int i = 1; i < n; ++i){
        cin >> l[i] >> r[i];
    }
    l[0] = -1000000000000;
    r[0] = 1000000000000;
    vector<long long int> p2(30, 1);
    for(long long int i = 1; i < 30; ++i){
        p2[i] = p2[i-1]*2;
    }
    long long int res = 0;
    for(long long int w = 0; w < p2[n]; ++w){
        vector<int> mask(n);
        long long int op = 0;
        long long int k = w;
        for(long long int i = 0; i < n; ++i){
            if(k%2 == 0){
                mask[i] = 0;
            } else{
                mask[i] = 1;
                op++;
            }
            k /= 2;
        }
        long long int ans = 0;
        long long int ch = 0;
        long long int mi = 0;
        long long int ma = 0;
        for(long long int i = 0; i < n; ++i){
            mi += l[i];
            ma += r[i];
            if(mask[i] == 1){
                if(ch == 0){
                    ch = 1;
                    mi = 0;
                    ma = 0;
                } else{
                    if(mi > 0 || ma < 0){
                        ans = 1;
                        break;
                    }
                }
            }
        }
        if(ans == 0){
            res = max(res, op);
        }
    }
    cout << res;
    return 0;
}
```