

Олимпиада СПбГУ по информатике 2020/21 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	20	25	445

Task A ()

```
#include <bits/stdc++.h>
using namespace std;

using ll = long long;
using ld = long double;

int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    cout << fixed << setprecision(20);
    int n; cin >> n;
    for (int i=1, p = 0; i <= n; i++) {
        if (i == n) cout << (i + p) % 10;
        p = (i + p) / 10;
    }
    return 0;
}
```

Task B ()

```
#include <bits/stdc++.h>
using namespace std;

using ll = long long;
using ld = long double;

#define sz(v) (int)v.size()

int main(){
    ios::sync_with_stdio(0); cin.tie(0);
    cout<<fixed<<setprecision(20);
    int n,k; cin>>n>>k;
    string s; cin>>s;

    int ans = 0;
    for (int i=0;i<n;){
        ans++;
        int j = i;
        set<char> v;

        while(j - i < k && (sz(v) < 3 || v.count(s[j]))){
            v.insert(s[j++]);
        }
        i = j;
    }cout<<ans;
    return 0;
}
```

Task C ()

```
#include <bits/stdc++.h>
using namespace std;

using ll = long long;
using ld = long double;

template <class T> bool ckmin(T &a,T b) { return a > b ? a=b, true : false;}

#define sz(v) (int)v.size()

const int N = 2e5 + 5e4 + 500;
const int INF = INT_MAX >> 1;

int pr[505][N]; // 1 - v, 2 - w

int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    // freopen("input.txt", "r", stdin); freopen("output.txt", "w", stdout);
    cout << fixed << setprecision(20);
    int n; cin >> n;
    int V, W; cin >> V >> W;

    vector<int> v(n), w(n);

    vector<int> dp(V+1, W+1), nl(dp);

    for(auto &e:v) cin >> e;
    for(auto &e:w) cin >> e;

    dp[0] = 0;
    for(int i=0; i<n; i++){
        vector<int> nw(nl);
        for(int j=0; j<=V; j++) if(dp[j] <= W){
            if(j + v[i] <= V && ckmin(nw[j + v[i]], dp[j])){
                pr[i][j+v[i]] = 1;
            }
            if(dp[j] + w[i] <= W && ckmin(nw[j], dp[j] + w[i])){
                pr[i][j] = 2;
            }
        }
        swap(dp, nw);
    }
    int k = -1;
    for(int i=0; i<=V; i++) if(dp[i] <= W){
        k = i;
    }
    if(k == -1){
        cout << -1;
        return 0;
    }
    vector<int> ans(n);
    for(int i=n-1, x=k, y=dp[k]; i>=0; i--){
        ans[i] = pr[i][x];
        if(ans[i] == 1){
            x -= v[i];
        } else {
            y -= w[i];
        }
    }
    for(auto e:ans) cout << (e == 1 ? 'x' : 'y');
    return 0;
}
```

Task D ()

```
#include <bits/stdc++.h>
using namespace std;

using ll = long long;
using ld = long double;

template <class T> bool ckmin(T &a,T b) { return a > b ? a=b, true : false;}

#define eb emplace_back
#define sz(v) (int)v.size()

const int N = 2e5 + 5e4 + 500;
const int INF = INT_MAX >> 1;

int val(char c){
    if(c == '(' || c == ')') return 0;
    return 1;
}

int main(){
    ios::sync_with_stdio(0); cin.tie(0);
    // freopen("input.txt", "r", stdin); freopen("output.txt", "w", stdout);
    cout<<fixed<<setprecision(20);
    int n; cin>>n;
    string s; cin>>s;
    vector<int> v;
    for(int i=0;i<2*n;i++){
        int x = val(s[i]);
        bool emp = false;
        while(!v.empty() && v.back() == x){
            v.pop_back();
            if(v.empty()) emp = true;
            else{
                x = v.back(); v.pop_back();
            }
        }
        if(!emp) v.eb(x);
    }
    n = sz(v);
    cout<<n / 2;
    return 0;
}
```

Task E ()

```
#include <bits/stdc++.h>
using namespace std;

using ll = long long;
using ld = long double;

template <class T> bool ckmin(T &a,T b) { return a > b ? a=b, true : false;}

#define eb emplace_back
#define sz(v) (int)v.size()
#define all(v) v.begin(),v.end()

const int N = 2e5 + 5e4 + 500;
const int INF = INT_MAX >> 1;
const ll mod = 1e9 + 17;
const ll mod2 = 1e9 - 173;

bool local = false;
int n,k;

ll fun(ll x){
    return (x + (mod - mod2) / 2) % n;
}

int ans = 0;
int solve1(vector<int> v){
    ll sum = 0;
    for(int i=0;i<k;i++) sum = ((sum * v[i] + mod) % mod2 + mod2) % mod;
    return fun(sum) + 1;
}

vector<int> v;

void read1(){
    cin>>n>>k;
    v.resize(k); for(auto &e:v) cin>>e;
}

void read2(){
    cin>>n>>k;
    v.resize(k+1); for(auto &e:v) cin>>e;
}

void solve2(){
    read2();

    random_shuffle(all(v));

    for(int i=0;i<=k;i++){
        vector<int> a;
        for(int j=0;j<=k;j++) if(i != j) a.eb(v[j]);
        int res = solve1(a);
        if(res == v[i]){
            for(auto e:a) cout<<e<<'_';
            return;
        }
    }
}

int main(){
    ios::sync_with_stdio(0); cin.tie(0);
    // freopen("input.txt", "r", stdin); freopen("output.txt", "w", stdout);
    cout<<fixed<<setprecision(20);
    string t; cin>>t;
    int q; cin>>q;

    srand(time(NULL));
    if(t == "add"){
        while(q--){
```

```
        read1();
        cout<<solve1(v)<<'\n';
    }
} else {
    while(q--> solve2());
}
return 0;
}
```

Task F ()

```
#include <bits/stdc++.h>
using namespace std;

using ll = long long;
using ld = long double;

template <class T> bool ckmin(T &a, T b) { return a > b ? a=b, true : false; }

#define eb emplace_back
#define sz(v) (int)v.size()
#define F first
#define S second

const int N = 2e5 + 5e4 + 500;
const int INF = INT_MAX >> 1;

int main() {
    ios::sync_with_stdio(0); cin.tie(0);
    // freopen("input.txt", "r", stdin); freopen("output.txt", "w", stdout);
    cout<<fixed<<setprecision(20);
    int n; cin>>n;
    cout<<"4\n0_0\n0_1\n1_1\n1_0\n";
    vector<pair<int, int>> v;
    for (int i=-1; i<=1; i++) for (int j=-1; j<=1; j++) if (abs(i) + abs(j) > 0) {
        v.eb(i, j);
    }
    for (int i=0; i<n; i++) cout<<v[i].F<<'<_><<v[i].S<<endl;
    return 0;
}
```