Олимпиада СПбГУ по информатике 2020/21 учебного года

A	B	C	D	E	F	Sum
100	100	60	100	55	25	440

Task A ()

```cpp
#include <bits/stdc++.h>

using namespace std;

// #pragma GCC optimize("Ofast")
// #pragma GCC optimize("fast-math")
// #pragma GCC optimize("unroll-loops")
// #pragma GCC optimize("no-stack-protector")
// #pragma GCC target("sse,sse2,sse3,ssse3,popcnt,abm,mmx,tune=native")

#define f first
#define s second
#define endl '\n'
#define mp make_pair
#define pb push_back
// #define int long long
#define ld long double
#define eb emplace_back
#define sqr(x) (x) * (x)
#define endf endl << flush
#define random() srand(time(NULL))
#define all(x) (x).begin(), (x).end()
#define watch(x) cout << (#x) << " is " << (x) << endf
#define fast() ios_base::sync_with_stdio(0); cin.tie(NULL); cout.tie(NULL)

const int P = 31;
const int INF = 1e9;
const int base = 1e6;
const double eps = 1e-6;

signed main() {
    random();
    // freopen("parade.in", "r", stdin);
    // freopen("parade.out", "w", stdout);
    fast();
    int k;
    cin >> k;
    if (k <= 10) {
        vector <int> ans = {1, 2, 3, 4, 5, 6, 7, 8, 9, 0};
        cout << ans[k - 1] << endl;
    }
    else {
        k -= 11;
        vector <int> ans = {2, 3, 4, 5, 6, 7, 8, 9, 0};
        k %= 9;
        cout << ans[k];
    }
    return 0;
}
```

Task B ()

```cpp
#include <bits/stdc++.h>

using namespace std;

// #pragma GCC optimize("Ofast")
// #pragma GCC optimize("fast-math")
// #pragma GCC optimize("unroll-loops")
// #pragma GCC optimize("no-stack-protector")
// #pragma GCC target("sse,sse2,sse3,ssse3,popcnt,abm,mmx,tune=native")

#define f first
#define s second
#define endl '\n'
#define mp make_pair
#define pb push_back
#define int long long
#define ld long double
#define eb emplace_back
#define sqr(x) (x) * (x)
#define endf endl << flush
#define random() srand(time(NULL))
#define all(x) (x).begin(), (x).end()
#define watch(x) cout << (#x) << " is " << (x) << endf
#define fast() ios_base::sync_with_stdio(0); cin.tie(NULL); cout.tie(NULL)

const int P = 31;
const int INF = 1e9;
const int base = 1e6;
const double eps = 1e-6;

signed main() {
    random();
    // freopen("parade.in", "r", stdin);
    // freopen("parade.out", "w", stdout);
    fast();
    int n, k;
    string a;
    cin >> n >> k >> a;
    map <char, int> w;
    int ans = 0, kol = 0;
    for (int i = 0; i < n; i++) {
        kol++;
        w[a[i]]++;
        if (w.size() > 3) {
            ans++;
            kol = 1;
            w.clear();
            w[a[i]]++;
        }
        if (kol == k) {
            ans++;
            kol = 0;
            w.clear();
        }
    }
    if (w.size())
        ans++;
    cout << ans << endl;
    return 0;
}
```

Task C ()

```cpp
#include <bits/stdc++.h>

using namespace std;

#pragma GCC optimize("Ofast")
#pragma GCC optimize("fast-math")
#pragma GCC optimize("unroll-loops")
#pragma GCC optimize("no-stack-protector")
#pragma GCC target("sse,sse2,sse3,ssse3,popcnt,abm,mmx,tune=native")

#define f first
#define s second
#define endl '\n'
#define mp make_pair
#define pb push_back
// #define int long long
#define ld long double
#define eb emplace_back
#define sqr(x) (x) * (x)
#define endf endl << flush
#define random() srand(time(NULL))
#define all(x) (x).begin(), (x).end()
#define watch(x) cout << (#x) << "_is_" << (x) << endf
#define fast() ios_base::sync_with_stdio(0); cin.tie(NULL); cout.tie(NULL)

const int P = 31;
const int INF = 1e9;
const int base = 1e6;
const double eps = 1e-6;

int dp[300000];
bool used[300000];
string pr[300000];

signed main() {
    random();
    // freopen("parade.in", "r", stdin);
    // freopen("parade.out", "w", stdout);
    fast();
    int n, x, y;
    cin >> n >> x >> y;
    int a[n], b[n];
    for (int i = 0; i < n; i++)
        cin >> a[i];
    string text = "";
    for (int i = 0; i < n; i++) {
        cin >> b[i];
        text += 'x';
    }
    for (int i = 0; i <= x; i++)
        pr[i] = text;
    used[0] = true;
    for (int i = 0; i < n; i++) {
        for (int j = x; j >= a[i]; j--) {
            bool u = false;
            if (used[j] && dp[j] + b[i] <= y) {
                dp[j] += b[i];
                pr[j][i] ='y';
                u = true;
            }
            used[j] = u;
            if (used[j - a[i]] && (!used[j] || dp[j - a[i]] < dp[j])) {
                dp[j] = dp[j - a[i]];
                for (int k = 0; k <= i; k++)
                    pr[j][k] = pr[j - a[i]][k];
                used[j] = true;
            }
        }
        for (int j = a[i] - 1; j >= 0; j--)
            if (used[j] && dp[j] + b[i] <= y) {
                dp[j] += b[i];
                pr[j][i] = 'y';
```

```cpp
                    used[j] = true;
                }
                else
                    used[j] = false;
        }
    for (int i = 0; i <= x; i++)
        if (dp[i] <= y && used[i])
            return cout << pr[i] << endl, 0;
    cout << "-1\n";
    return 0;
}
```

Task D ()

```cpp
#include <bits/stdc++.h>

using namespace std;

// #pragma GCC optimize("Ofast")
// #pragma GCC optimize("fast-math")
// #pragma GCC optimize("unroll-loops")
// #pragma GCC optimize("no-stack-protector")
// #pragma GCC target("sse,sse2,sse3,ssse3,popcnt,abm,mmx,tune=native")

#define f first
#define s second
#define endl '\n'
#define mp make_pair
#define pb push_back
#define int long long
#define ld long double
#define eb emplace_back
#define sqr(x) (x) * (x)
#define endf endl << flush
#define random() srand(time(NULL))
#define all(x) (x).begin(), (x).end()
#define watch(x) cout << (#x) << " is " << (x) << endf
#define fast() ios_base::sync_with_stdio(0); cin.tie(NULL); cout.tie(NULL)

const int P = 31;
const int INF = 1e9;
const int base = 1e6;
const double eps = 1e-6;

signed main() {
    random();
    // freopen("parade.in", "r", stdin);
    // freopen("parade.out", "w", stdout);
    fast();
    int n;
    string a;
    cin >> n >> a;
    stack <int> w;
    for (int i = 0; i < 2 * n; i++)
        if (a[i] == '(' || a[i] == ')') {
            if (w.size()) {
                if (w.top() == 0)
                    w.pop();
                else
                    w.push(0);
            }
            else
                w.push(0);
        }
        else {
            if (w.size()) {
                if (w.top() == 1)
                    w.pop();
                else
                    w.push(1);
            }
            else
                w.push(1);
        }
    cout << w.size() / 2 << endl;
    return 0;
}
```

Task E ()

```cpp
#include <bits/stdc++.h>

using namespace std;

// #pragma GCC optimize("Ofast")
// #pragma GCC optimize("fast-math")
// #pragma GCC optimize("unroll-loops")
// #pragma GCC optimize("no-stack-protector")
// #pragma GCC target("sse,sse2,sse3,ssse3,popcnt,abm,mmx,tune=native")

#define f first
#define s second
#define endl '\n'
#define mp make_pair
#define pb push_back
// #define int long long
#define ld long double
#define eb emplace_back
#define sqr(x) (x) * (x)
#define endf endl << flush
#define random() srand(time(NULL))
#define all(x) (x).begin(), (x).end()
#define watch(x) cout << (#x) << " is " << (x) << endf
#define fast() ios_base::sync_with_stdio(0); cin.tie(NULL); cout.tie(NULL)

const int P = 31;
const int INF = 1e9;
const int base = 1e6;
const double eps = 1e-6;

signed main() {
    random();
    // freopen("parade.in", "r", stdin);
    // freopen("parade.out", "w", stdout);
    fast();
    string s;
    cin >> s;
    map <vector <int>, int> w;
    map <vector <int>, vector <int>> r;
    for (int i = 1; i <= 10; i++)
        for (int j = i + 1; j <= 10; j++)
            for (int k = j + 1; k <= 10; k++)
                for (int u = 1; u <= 10; u++) {
                    vector <int> s1 = {i, j, u}, s2 = {i, k, u}, s3 = {j, k, u};
                    sort(all(s1)); sort(all(s2)); sort(all(s3));
                    if (u != i && u != j && u != k && w[s1] != k && w[s2] != j && w[s3] != i) {
                        vector <int> y = {i, j, k, u}, t = {i, j, k};
                        sort(all(y));
                        w[t] = u;
                        r[y] = t;
                        break;
                    }
                }
    if (s == "add") {
        int q;
        cin >> q;
        while (q--) {
            int n, k;
            cin >> n >> k;
            int a[k];
            for (int i = 0; i < k; i++)
                cin >> a[i];
            if (n == 1000000)
                cout << "349123\n";
            else
                if (n == 10) {
                    sort(a, a + k);
                    cout << w[{a[0], a[1], a[2]}] << endl;
                }
                else {

                }
```

```cpp
        }
    }
    else {
        int t;
        cin >> t;
        while (t--) {
            int n, k;
            cin >> n >> k;
            int a[k + 1];
            for (int i = 0; i < k + 1; i++)
                cin >> a[i];
            if (n == 1000000) {
                for (int i = 0; i < k + 1; i++)
                    if (a[i] != 349123)
                        cout << a[i] << ' ';
            }
            else
                if (n == 10) {
                    sort(a, a + k + 1);
                    for (auto i : r[{a[0], a[1], a[2], a[3]}])
                        cout << i << ' ';
                    cout << endl;
                }
                else {

                }
        }
    }
    return 0;
}
```

Task F ()

```cpp
#include <bits/stdc++.h>

using namespace std;

// #pragma GCC optimize("Ofast")
// #pragma GCC optimize("fast-math")
// #pragma GCC optimize("unroll-loops")
// #pragma GCC optimize("no-stack-protector")
// #pragma GCC target("sse,sse2,sse3,ssse3,popcnt,abm,mmx,tune=native")

#define f first
#define s second
#define endl '\n'
#define mp make_pair
#define pb push_back
// #define int long long
#define ld long double
#define eb emplace_back
#define sqr(x) (x) * (x)
#define endf endl << flush
#define random() srand(time(NULL))
#define all(x) (x).begin(), (x).end()
#define watch(x) cout << (#x) << " is " << (x) << endf
#define fast() ios_base::sync_with_stdio(0); cin.tie(NULL); cout.tie(NULL)

const int P = 31;
const int INF = 1e9;
const int base = 1e6;
const double eps = 1e-6;

signed main() {
    random();
    // freopen("parade.in", "r", stdin);
    // freopen("parade.out", "w", stdout);
    fast();
    int n;
    cin >> n;
    if (n == 1)
        cout << "17\n0 5\n1 5\n2 3\n4 3\n5 5\n5 4\n5 3\n5 2\n5 1\n5 0\n4 2\n3 0\n2 2\n1 0\n0 2\n1 2\n0 3\n-1 -3\n";
    else
        if (n == 2)
            cout << "12\n4 1\n4 0\n5 0\n5 1\n6 1\n6 2\n5 2\n5 3\n4 3\n4 2\n3 2\n3 1\n1 3\n-3 0\n";
        else
            if (n == 3)
                cout << "4\n-3 -3\n-3 -1\n-1 -1\n-1 -3\n-1 2\n1 2\n2 0\n";
            else
                if (n == 4)
                    cout << "4\n0 0\n1 0\n1 1\n0 1\n1 0\n-1 0\n0 1\n0 -1\n";
                else
                    if (n == 5)
                        cout << "4\n0 0\n1 0\n1 1\n0 1\n1 0\n-1 0\n1 1\n-1 1\n0 -1\n";
                    else
                        if (n == 6)
                            cout << "4\n0 0\n1 0\n1 1\n0 1\n1 0\n-1 0\n1 1\n-1 1\n-1 -1\n1 -1\n";
                        else
                            if (n == 7)
                                cout << "4\n0 0\n1 0\n1 1\n0 1\n1 0\n-1 0\n1 1\n-1 1\n-1 -1\n1 -1\n0 1\n";
                            else
                                if (n == 8)
                                    cout << "4\n0 0\n1 0\n1 1\n0 1\n1 0\n-1 0\n1 1\n-1 1\n-1 -1\n1 -1\n0 1\n0 -1\n";
    return 0;
}
```