

Олимпиада СПбГУ по информатике 2020/21 учебного года

A	B	C	D	E	F	Sum
100	100	100	100	55	25	480

Task A ()

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

void solve() {
    int k;
    cin >> k;
    int cur = 0;
    for (int i = 1, next = 0; i <= k; ++i) {
        cur = next + i;
        next = cur / 10;
    }
    cout << cur % 10 << "\n";
}

signed main() {
    ios_base::sync_with_stdio(0); cin.tie(0);
    int t = 1;
    //cin >> t;
    while (t--) solve();
    return 0;
}
```

Task B ()

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

void solve() {
    int n, k;
    cin >> n >> k;
    string ss;
    cin >> ss;
    set<char> st;
    int ans = 1;
    for (int i = 0, l = 0; i < n; ++i) {
        if (l == k || st.size() == 3 && st.find(ss[i]) == st.end()) {
            ++ans;
            l = 1;
            st.clear();
            st.insert(ss[i]);
        } else {
            st.insert(ss[i]);
            ++l;
        }
    }
    cout << ans;
}

signed main() {
    ios_base::sync_with_stdio(0); cin.tie(0);
    int t = 1;
    //cin >> t;
    while (t--) solve();
    return 0;
}
```

Task C ()

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

const int inf = 1e9;

void solve() {
    int n, x, y;
    cin >> n >> x >> y;
    vector<int> vv(n), ww(n);
    for (int i = 0; i < n; ++i) cin >> vv[i];
    for (int i = 0; i < n; ++i) cin >> ww[i];
    vector<vector<int>> dp(n + 1, vector<int>(x + 1, inf));
    dp[0][0] = 0;
    for (int i = 0; i < n; ++i)
        for (int j = 0; j <= x; ++j) {
            if (j + vv[i] <= x) dp[i + 1][j + vv[i]] = min(dp[i + 1][j + vv[i]], dp[i][j]);
            if (dp[i][j] + ww[i] <= y) dp[i + 1][j] = min(dp[i + 1][j], dp[i][j] + ww[i]);
        }
    int ind = -1;
    for (int i = 0; i <= x; ++i)
        if (dp[n][i] != inf) {
            ind = i;
            break;
        }
    if (ind == -1) {
        cout << -1;
        return;
    }
    string ans;
    for (int cur = ind, i = n - 1; i >= 0; --i) {
        if (cur - vv[i] >= 0) if (dp[i][cur - vv[i]] == dp[i + 1][cur]) {
            ans.push_back('x');
            cur -= vv[i];
            continue;
        }
        ans.push_back('y');
    }
    reverse(ans.begin(), ans.end());
    cout << ans;
}

signed main() {
    ios_base::sync_with_stdio(0); cin.tie(0);
    int t = 1;
    // cin >> t;
    while (t--) solve();
    return 0;
}
```

Task D ()

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

const int inf = 1e9;

void solve() {
    int n;
    cin >> n;
    int prev = -1, cnt_cur = 0;
    vector<int> res;
    for (int i = 0; i < 2 * n; ++i) {
        char c;
        cin >> c;
        int cur;
        if (c == '(' || c == ')') cur = 1;
        else cur = 2;
        if (cur == prev) ++cnt_cur;
        else {
            if (cnt_cur % 2) res.push_back(prev);
            cnt_cur = 1;
        }
        prev = cur;
    }
    if (cnt_cur % 2) res.push_back(prev);
    stack<int> st;
    for (int i = 0; i < res.size(); ++i) {
        if (st.empty()) {
            st.push(res[i]);
            continue;
        }
        if (st.top() == res[i]) st.pop();
        else st.push(res[i]);
    }
    cout << st.size() / 2;
}

signed main() {
    ios_base::sync_with_stdio(0); cin.tie(0);
    int t = 1;
    // cin >> t;
    while (t--) solve();
    return 0;
}
```

Task E ()

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

const int inf = 1e9;

void solve() {
    string type;
    cin >> type;
    int t;
    cin >> t;

    map<set<int>, int> mp1, mp2;
    for (int a = 1; a <= 10; ++a)
        for (int b = a + 1; b <= 10; ++b)
            for (int c = b + 1; c <= 10; ++c) {
                for (int i = 1; i <= 10; ++i) {
                    if (i == a || i == b || i == c) continue;
                    if (mp1[set<int>({a, b, c, i})] == 0) {
                        mp1[set<int>({a, b, c, i})] = i;
                        mp2[set<int>({a, b, c})] = i;
                        break;
                    }
                }
            }

    map<int, int> mp3, mp4;
    for (int i = 1; i < 1 << 20; ++i) {
        if (__builtin_popcount(i) > 10) continue;
        for (int j = 0; j < 20; ++j) {
            if (i & 1 << j) continue;
            if (mp3[i | 1 << j] == 0) {
                mp3[i | 1 << j] = j + 1;
                mp4[i] = j + 1;
                break;
            }
        }
    }

    while (t--) {
        if (type == "add") {
            int n, k;
            cin >> n >> k;
            if (n == 10) {
                set<int> st;
                for (int i = 0; i < k; ++i) {
                    int a;
                    cin >> a;
                    st.insert(a);
                }
                cout << mp2[st] << "\n";
            } else if (n == 1000000) {
                vector<bool> aa(n, 0);
                for (int i = 0; i < k; ++i) {
                    int a;
                    cin >> a;
                    aa[a - 1] = 1;
                }
                int bt = 0;
                for (int k = 0; k < 20; ++k)
                    for (int i = 0; i < 50000; ++i)
                        if (aa[k * 50000 + i]) {
                            bt = bt | 1 << k;
                            break;
                        }
                cout << mp4[bt] * 50000 << "\n";
            }
        } else {
            int n, k;
            cin >> n >> k;
            set<int> st;
            if (n == 10) {
```

```

vector<int> aa;
for (int i = 0; i < k + 1; ++i) {
    int a;
    cin >> a;
    st.insert(a);
    aa.push_back(a);
}
int x = mp1[st];
for (int i = 0; i < k + 1; ++i)
    if (aa[i] == x) aa.erase(aa.begin() + i);
for (int i = 0; i < k; ++i) cout << aa[i] << "_";
cout << "\n";
} else if (n == 1000000) {
    vector<bool> aa(n, 0);
    vector<int> vec;
    for (int i = 0; i < k + 1; ++i) {
        int a;
        cin >> a;
        aa[a - 1] = 1;
        vec.push_back(a);
    }
    int bt = 0;
    for (int k = 0; k < 20; ++k)
        for (int i = 0; i < 50000; ++i)
            if (aa[k * 50000 + i]) {
                bt = bt | 1 << k;
                break;
            }
    int x = mp3[bt] * 50000;
    for (int i = 0; i < k + 1; ++i)
        if (vec[i] == x) vec.erase(vec.begin() + i);
    for (int i = 0; i < k; ++i) cout << vec[i] << "_";
    cout << "\n";
}
}
}

int32_t main() {
    ios_base::sync_with_stdio(0); cin.tie(0);
    int t = 1;
    //cin >> t;
    while (t--) solve();
    return 0;
}

```

Task F ()

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

const int inf = 1e9;

void solve() {
    int n;
    cin >> n;
    if (n > 8) return;
    cout << 4 << "\n";
    cout << "-1_1\n" << "1_1\n" << "1_1\n" << "-1_1\n";
    vector<pair<int, int>> aa;
    for (int i = -2; i < 4; i += 2)
        for (int j = -2; j < 4; j += 2)
            if (i != 0 || j != 0) aa.push_back({i, j});
    for (int i = 0; i < n; ++i) cout << aa[i].first << "_" << aa[i].second << "\n";
}

signed main() {
    ios_base::sync_with_stdio(0); cin.tie(0);
    int t = 1;
    // cin >> t;
    while (t--) solve();
    return 0;
}
```