

Олимпиада СПбГУ по информатике 2020/21 учебного года

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

Task A ()

```
#include <iostream>
#include <vector>
#include <set>
#include <cmath>
#include <algorithm>
#include <map>

#define int long long
#define vi vector<int>
#define vpII vector<pair<int, int>>

using namespace std;

bool cmp(pair<pair<int, int>, int> a, pair<pair<int, int>, int> b) {
    return a.first.first - a.first.second > b.first.first - b.first.second;
}

void solve() {
    /*int cnt = 0;
    string s;
    int dop = 0;
    for (int i = 0; i < 100; i++) {
        cnt++;
        s.push_back((char)((cnt + dop) % 10 + '0'));
        dop = (dop + cnt) / 10;
    }
    reverse(s.begin(), s.end());
    cout << s;*/
    int k;
    cin >> k;
    if (k <= 10) {
        cout << k % 10;
        return;
    }
    k -= 10;
    //0 9 8 7 6 5 4 3 2
    if (k % 9 == 0) {
        cout << "0\n";
    }
    else {
        cout << k % 9 + 1;
    }
}

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

Task B ()

```
#include <iostream>
#include <vector>
#include <set>
#include <cmath>
#include <algorithm>
#include <map>

#define int long long
#define vi vector<int>
#define vpII vector<pair<int, int>>

using namespace std;

void solve() {
    int n, k;
    string s;
    cin >> n >> k >> s;
    int ans = 0;
    for (int i = 0; i < n; i++) {
        int j = i;
        set<char> st;
        st.insert(s[i]);
        while (j + 1 < n && j + 1 <= i + k - 1) {
            st.insert(s[j + 1]);
            if (st.size() > 3) break;
            j++;
        }
        ans++;
        i = j;
    }
    cout << ans;
}

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

Task C ()

```
#include <iostream>
#include <vector>
#include <set>
#include <cmath>
#include <algorithm>
#include <map>
#include <stack>

// #define int long long
#define vi vector<int>
#define vpai vector<pair<int, int>>

using namespace std;

void solve() {
    /*
    */
    int n, x, y;
    cin >> n >> x >> y;
    vpai a(n);
    for (int i = 0; i < n; i++) {
        cin >> a[i].first;
    }
    for (int i = 0; i < n; i++) {
        cin >> a[i].second;
    }
    vector<vector<int>> dp(n + 1, vi(x + 1, -1e9));
    vector<vector<int>> pred(n + 1, vi(x + 1));
    dp[0][x] = y;
    for (int i = 0; i < n; i++) {
        for (int cur_x = x; cur_x >= 0; cur_x--) {
            if (dp[i][cur_x] == -1e9) continue;
            if (cur_x - a[i].first >= 0) {
                if (dp[i][cur_x] > dp[i + 1][cur_x - a[i].first]) {
                    dp[i + 1][cur_x - a[i].first] = dp[i][cur_x];
                    pred[i + 1][cur_x - a[i].first] = cur_x;
                }
            }
            if (dp[i][cur_x] - a[i].second >= 0) {
                if (dp[i][cur_x] - a[i].second > dp[i + 1][cur_x]) {
                    dp[i + 1][cur_x] = dp[i][cur_x] - a[i].second;
                    pred[i + 1][cur_x] = cur_x;
                }
            }
        }
    }

    int val = -1;
    for (int cur_x = x; cur_x >= 0; cur_x--) {
        if (dp[n][cur_x] >= 0) val = cur_x;
    }
    // cout << val << "\n";
    if (val == -1) {
        cout << "-1\n";
        return;
    }

    string res;
    for (int i = n; i > 0; i--) {
        if (pred[i][val] == val) res.push_back('y');
        else res.push_back('x');
        val = pred[i][val];
    }
    reverse(res.begin(), res.end());
    cout << res;
}

signed main() {
```

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

Task D ()

```
#include <iostream>
#include <vector>
#include <set>
#include <cmath>
#include <algorithm>
#include <map>
#include <stack>

#define int long long
#define vi vector<int>
#define vpai vector<pair<int, int>>

using namespace std;

void solve() {
    int n;
    string s;
    cin >> n >> s;
    stack<char> st;
    for (int i = 0; i < n * 2; i++) {
        if (s[i] == ')' || s[i] == '[') {
            if (st.size() == 0) {
                if (s[i] == ')') st.push('(');
                else st.push('[');
            }
            else {
                if (s[i] == ')') {
                    if (st.top() == '(') st.pop();
                    else {
                        st.push('(');
                    }
                }
                else {
                    if (st.top() == '[') st.pop();
                    else {
                        st.push('[');
                    }
                }
            }
        }
        else {
            if (st.size() == 0) {
                st.push(s[i]);
                continue;
            }
            if (s[i] == '(') {
                if (st.top() == '(') st.pop();
                else st.push(s[i]);
            }
            else {
                if (st.top() == '[') st.pop();
                else st.push(s[i]);
            }
        }
    }
    cout << st.size() / 2;
}

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

}

Task E ()

```
#include <iostream>
#include <vector>
#include <set>
#include <cmath>
#include <algorithm>
#include <map>
#include <stack>

#define int long long
#define vi vector<int>
#define vpii vector<pair<int, int>>

using namespace std;

int check(int a, int b, int c) {
    vi s = { a, b, c };
    sort(s.begin(), s.end());
    a = s[0];
    b = s[1];
    c = s[2];
    int cur = 0, cnt = 0;
    for (int i = 1; i <= 10; i++) {
        if (i == a || i == b || i == c) continue;
        cur = i;
        cnt++;
        if (cnt == 4) return cur;
    }
}

int val = 31005;

void solve() {
    map<pair<pair<int, int>, int>, set<int>> mp;
    for (int a = 1; a <= 10; a++) {
        for (int b = a + 1; b <= 10; b++) {
            for (int c = b + 1; c <= 10; c++) {
                set<int> s;
                for (int i = 1; i <= 10; i++) {
                    s.insert(i);
                }
                s.erase(a);
                s.erase(b);
                s.erase(c);
                mp[{ {a, b}, c}] = s;
            }
        }
    }

    map<pair<pair<int, int>, int>, int> new_mp;
    for (int a = 1; a <= 10; a++) {
        for (int b = a + 1; b <= 10; b++) {
            for (int c = b + 1; c <= 10; c++) {
                int cur = *mp[{ {a, b}, c}].begin();

                vi vec = { a, b, c, cur };
                sort(vec.begin(), vec.end());
                mp[{ {vec[0], vec[1]}, vec[2]}].erase(vec[3]);
                mp[{ {vec[0], vec[1]}, vec[3]}].erase(vec[2]);
                mp[{ {vec[0], vec[2]}, vec[3]}].erase(vec[1]);
                mp[{ {vec[1], vec[2]}, vec[3]}].erase(vec[0]);
                new_mp[{ {a, b}, c}] = cur;
            }
        }
    }

    string s;
    cin >> s;
    int t;
    cin >> t;
```

```

while (t--) {
    if (s == "add") {
        int n, k;
        cin >> n >> k;
        vi a(k);
        for (int i = 0; i < k; i++) {
            cin >> a[i];
        }
        if (n == 10) {
            sort(a.begin(), a.end());
            cout << new_mp[{ {a[0], a[1]}, a[2]}] << "\n";
        }
        else
            cout << val << "\n";
    }
    else {
        int n, k;
        cin >> n >> k;
        if (n == 10) {
            vi a(k + 1);
            for (int i = 0; i < k + 1; i++) {
                cin >> a[i];
            }
            sort(a.begin(), a.end());
            if (new_mp[{ {a[0], a[1]}, a[2]}] == a[3]) {
                cout << a[0] << '⌋' << a[1] << '⌋' << a[2] << "\n";
            }
            else if (new_mp[{ {a[1], a[2]}, a[3]}] == a[0]) {
                cout << a[1] << '⌋' << a[2] << '⌋' << a[3] << "\n";
            }
            else if (new_mp[{ {a[0], a[2]}, a[3]}] == a[1]) {
                cout << a[0] << '⌋' << a[2] << '⌋' << a[3] << "\n";
            }
            else {
                cout << a[0] << '⌋' << a[1] << '⌋' << a[3] << "\n";
            }
        }
        else {
            for (int i = 0; i < k + 1; i++) {
                int x;
                cin >> x;
                if (x != val) {
                    cout << x << '⌋';
                }
            }
            cout << "\n";
        }
    }
}

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

```


Task F ()

```
#include <iostream>
#include <vector>
#include <set>
#include <cmath>
#include <algorithm>
#include <map>
#include <stack>

#define int long long
#define vi vector<int>
#define vpII vector<pair<int, int>>

using namespace std;

int check(int a, int b, int c) {
    vi s = { a, b, c };
    sort(s.begin(), s.end());
    a = s[0];
    b = s[1];
    c = s[2];
    int cur = 0, cnt = 0;
    for (int i = 1; i <= 10; i++) {
        if (i == a || i == b || i == c) continue;
        cur = i;
        cnt++;
        if (cnt == 4) return cur;
    }
}

int val = 427320;

void solve() {
    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\n1_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\n0\n";
    }
    else if (n == 3) {
        cout << "4\n3_3\n3_1\n1_1\n1_3\n1_2\n1_2\n2_0\n";
    }
    else if (n == 4) {
        cout << "4\n1_1\n1_1\n1_1\n1_1\n2_0\n0_2\n0_2\n";
    }
    else if (n == 5) {
        cout << "4\n1_1\n1_1\n1_1\n1_1\n2_1\n2_1\n2_1\n0_2\n";
    }
    else if (n == 6) {
        cout << "4\n1_1\n1_1\n1_1\n1_1\n2_1\n2_1\n2_1\n0_2\n0_2\n";
    }
    else if (n == 7) {
        cout << "4\n1_1\n1_1\n1_1\n1_1\n2_0\n2_0\n0_2\n0_2\n2_2\n2_2\n2_2\n";
    }
    else if (n == 8) {
        cout << "4\n1_1\n1_1\n1_1\n1_1\n2_0\n2_0\n0_2\n0_2\n2_2\n2_2\n2_2\n2_2\n";
    }
}

signed main() {
    ios_base::sync_with_stdio(false);
    cin.tie(0);
    cout.tie(0);
    int t = 1;
```

```
    // cin >> t;  
    while (t--) {  
        solve();  
    }  
}
```